AKAI
DIGITAL

DR16

HARD DISK RECORDER

Operator's Manual

WARNING
To prevent fire or shock hazard, do not expose this appliance to rain or moisture.

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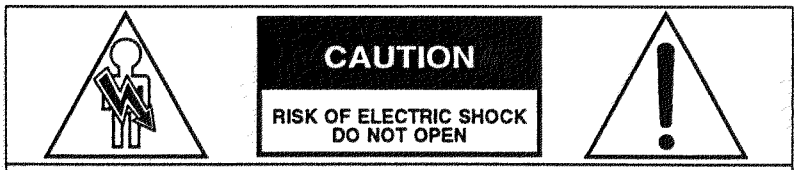
1-En



CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK,
DO NOT REMOVE COVER (OR BACK).
NO USER-SERVICEABLE PARTS INSIDE.
REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.

THE SYMBOLS ARE RULED BY UL STANDARDS (U.S.A)

The lightning flash with the arrowhead symbol superimposed across a graphical representation of a person, within an equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure; that may be of sufficient magnitude to constitute a risk of electric shock.

The exclamation point within an equilateral triangle is intented to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

5A-En

WARNING

The DR16 is designed to be used in a standard household environment.
Power requirements for electrical equipment vary from area to area. Please ensure that your DR16 meets the power requirements in your area. If in doubt, consult a qualified electrician or Akai Professional dealer.

120VAC	@ 60Hz for USA and Canada
220-230/240VAC	@ 50Hz for Europe
240VAC	@ 50Hz for Australia

PROTECTING YOURSELF AND THE DR16

* Never touch the AC plug with wet hands.
* Always disconnect the DR16 from the power supply by pulling on the plug, not the cord.
* Allow only an Akai Professional dealer or qualified professional engineer to repair or reassemble the DR16. Apart from voiding the warranty, unauthorized engineers might touch live internal parts and receive a serious electric shock.
* Do not put, or allow anyone to put any object, especially metal objects, into the DR16.
* Use only a household AC power supply. Never use a DC power supply.
* If water or any other liquid is spilled into or onto the DR16, disconnect the power, and call your dealer.
* Make sure that the unit is well-ventilated, and away from direct sunlight.
* To avoid damage to internal circuitry, as well as the external finish, keep the DR16 away from sources of direct heat (stoves, radiators, etc.).
* Avoid using aerosol insecticides, etc. near the DR16. They may damage the surface, and may ignite.
* Do not use denaturated alcohol, thinner or similar chemicals to clean the DR16. They will damage the finish.
* Modification of this equipment is dangerous, and can result in the functions of the DR16 being impaired. Never attempt to modify the equipment in any way.
* In order to assure optimum performance of your DR16, select the setup location carefully, and make sure the equipment is used properly. Avoid setting up the DR16 in the following locations:
    1. In a humid or dusty environment
    2. In a room with poor ventilation
    3. On a surface which is not horizontal
    4. Inside a vehicle such as a car, where it will be subject to vibration
    5. In an extremely hot or cold environment

Precautions When Using the Installed Hard Disk Drive

1. The hard disk drive has extremely high precision and is vulnerable to shock and vibration. If transporting the DR16 by either land or air, we recommend packing it in a shell-shaped case lined with urethane rubber which meets ATA specifications.

2. Make sure the DR16 is used in the horizontal position. Do not set it on end or tilt it when using it.

3. If the DR16 is moved from a cold location to a warm one, or if the temperature has been raised suddenly, condensation may form inside the DR16. If it is impossible to avoid conditions like these, let the DR16 sit for at least an hour in the new location before using it.

4. When setting up the DR16, make sure the ventilation opening is not blocked. Also, if using the DR16 in a rack that contains other equipment, make sure sufficient ventilation space is assured on all sides (approx. 44 mm of space between the DR16 and any equipment mounted above or below it in the rack).

WARNING

THIS APPARATUS MUST BE EARTHED

IMPORTANT

This equipment is fitted with an approved non-rewireable UK mains plug.

To change the fuse in this type of plug proceed as follows:

1) Remove the fuse cover and old fuse.
2) Fit a new fuse which should be a BS1362 5 Amp A.S.T.A or BSI approved type.
3) Refit the fuse cover.

If the AC mains plug fitted to the lead supplied with this equipment is not suitable for your type of AC outlet sockets, it should be changed to an AC mains lead, complete with moulded plug, to the appropriate type. If this is not possible, the plug should be cut off and a correct one fitted to suit the AC outlet. This should be fused at 5 Amps.

If a plug without a fuse is used, the fuse at the distribution board should NOT BE GREATER than 5 Amp.

PLEASE NOTE: THE SEVERED PLUG MUST BE DESTROYED TO AVOID A POSSIBLE SHOCK HAZARD SHOULD IT BE INSERTED INTO A 13 AMP SOCKET ELSEWHERE.

The wires in this mains lead are coloured in accordance with the following code:

GREEN and **YELLOW**	— EARTH
BLUE	— NEUTRAL
BROWN	— LIVE

As the colours of the wires in the mains lead of this apparatus may not correspond with the coloured markings identifying the terminals in your plug, please proceed as follows:

The wire which is coloured GREEN and YELLOW must be connected to the terminal which is marked with the letter E or with the safety earth symbol ⏚ or coloured GREEN or coloured GREEN and YELLOW.

The wire which is coloured BLUE must be connected to the terminal which is marked with the letter N or coloured BLACK.

The wire which is coloured BROWN must be connected to the terminal which is marked with the letter L or coloured RED.

THIS APPARATUS MUST BE EARTHED

Ensure that all the terminals are securely tightened and no loose strands of wire exist.

Before replacing the plug cover, make certain the cord grip is clamped over the outer sheath of the lead and not simply over the wires.

6D-En

FCC WARNING

This equipment has been tested and found to comply with the limits for a Class B digital device pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help. 21B-En

AVIS POUR LES ACHETEURS CANADIENS DU DR16

Le présent appareil numérique n'ément pas des bruits radioélectriques dépassant les limites applicables aux appareils numériques de la Class B prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada 27-F

This digital apparatus does not exceed the Class B limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications. 27-En

FÜR KUNDEN IN DER BUNDESREPUBLIK DEUTSCHLAND

Bescheinigung von AKAI

Hiermit wird bescheinigt, daß das Gerät AKAI
DR16
in Übereinstimmung mit den Bestimmungen der
Amtsblattverfügung 1046/1984
funkentstört ist.

Der Deutschen Bundespostwurde das Inverkehrbringen dieses Gerätes angezeigt und die Berichtigung zur Überprüfung der Serie auf Einhaltung der Bestimmungen eingeräumt.
AKAI ELECTRIC CO., LTD 17B-G

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WARRANTY

AKAI Electric Co. Ltd warrants its products, when purchased from an authorized AKAI dealer, to be free from defects in materials and workmanship for a period of 12 (twelve) months from the date of purchase. Warranty service is effective and available to the original purchaser only, and only on completion and return of the AKAI Warranty Registration Card within 14 days of purchase.

Warranty coverage is valid for factory-authorized updates to AKAI instruments and their software, when their installation is performed by an authorized AKAI Service Centre, and a properly completed Warranty Registration has been returned to your Akai Professional dealer.

To obtain service under this warranty, the product must, on discovery of the defect, be properly packed and shipped to the nearest AKAI Service Centre. The party requesting warranty service must provide proof of original ownership and date of purchase of the product.

If the warranty is valid, AKAI will, without charge for parts or labour, either repair or replace the defective part(s). Without a valid warranty, the entire cost of the repair (parts and labour) is the responsibility of the product's owner.

AKAI warrants that it will make all necessary adjustments, repairs and replacements at no cost to the original owner within 12 (twelve) months of the purchase date if:

1 The product fails to perform its specified functions due to failure of one or more of its components.

2 The product fails to perform its specified functions due to defects in workmanship.

3 The product has been maintained and operated by the owner in strict accordance with the written instructions for proper maintenance and use as specified in this Operator's Manual.

Before purchase and use, owners should determine the suitability of the product for their intended use, and the owner assumes all risk and liability whatsoever in connection therewith. AKAI shall not be liable for any injury, loss or damage, direct or consequential, arising out of the use, or inability to use the product.

The warranty provides only those benefits specified, and does not cover defects or repairs needed as a result of acts beyond the control of AKAI, including, but not limited to:

1 Damage caused by abuse, accident or negligence. AKAI will not cover under warranty any original factory disk damaged or destroyed as a result of the owner's mishandling.

2 Damage caused by any tampering, alteration or modification of the product: operating software, mechanical or electronic components.

3 Damage caused by failure to maintain and operate the product in strict accordance with the written instructions for proper maintenance and use as specified in this Operator's Manual.

4 Damage caused by repairs or attempted repairs by unauthorized persons.

5 Damage caused by fire, smoke, falling objects, water or other liquids, or natural events such as rain, floods, earthquakes, lightning, tornadoes, storms, etc.

6 Damage caused by operation on improper voltages.

IMPORTANT NOTE: This warranty becomes void if the product or its software is electronically modified, altered or tampered with in any way.

AKAI shall not be liable for costs involved in packing or preparing the product for shipping, with regard to time, labour or materials, shipping or freight costs, or time and expenses involved in transporting the product to and from an AKAI Authorized Service Centre or Authorized Dealer.

AKAI will not cover under warranty an apparent malfunction that is determined to be user error, or the owner's inability to use the product.

THE DURATION OF ANY OTHER WARRANTIES, WHETHER IMPLIED OR EXPRESS, INCLUDING BUT NOT LIMITED TO THE IMPLIED CONDITION OF MERCHANTABILITY, IS LIMITED TO THE DURATION OF THE EXPRESS WARRANTY HEREIN.

AKAI hereby excludes incidental or consequential damages, including but not limited to:

1 Loss of time

2 Inconvenience

3 Delay in performance of the Warranty

4 The loss of use of the product

5 Commercial loss

6 Breach of any express or implied warranty, including the Implied Warranty of Merchantability, applicable to this product

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Introduction

From all at Akai, thank you for purchasing an Akai DR16 Hard Disk Recorder, and welcome to the exciting world of hard disk recording.

Please take the time to read this manual. It will allow you to get the best out of your DR16.

What is the DR16?

Take a conventional sixteen-track recorder, replace all the analog circuitry with the latest digital audio processing technology, replace the tape transport with a hard disk for near-instant digital audio data access, and add a 16-channel programmable digital mixer — the result is the DR16.

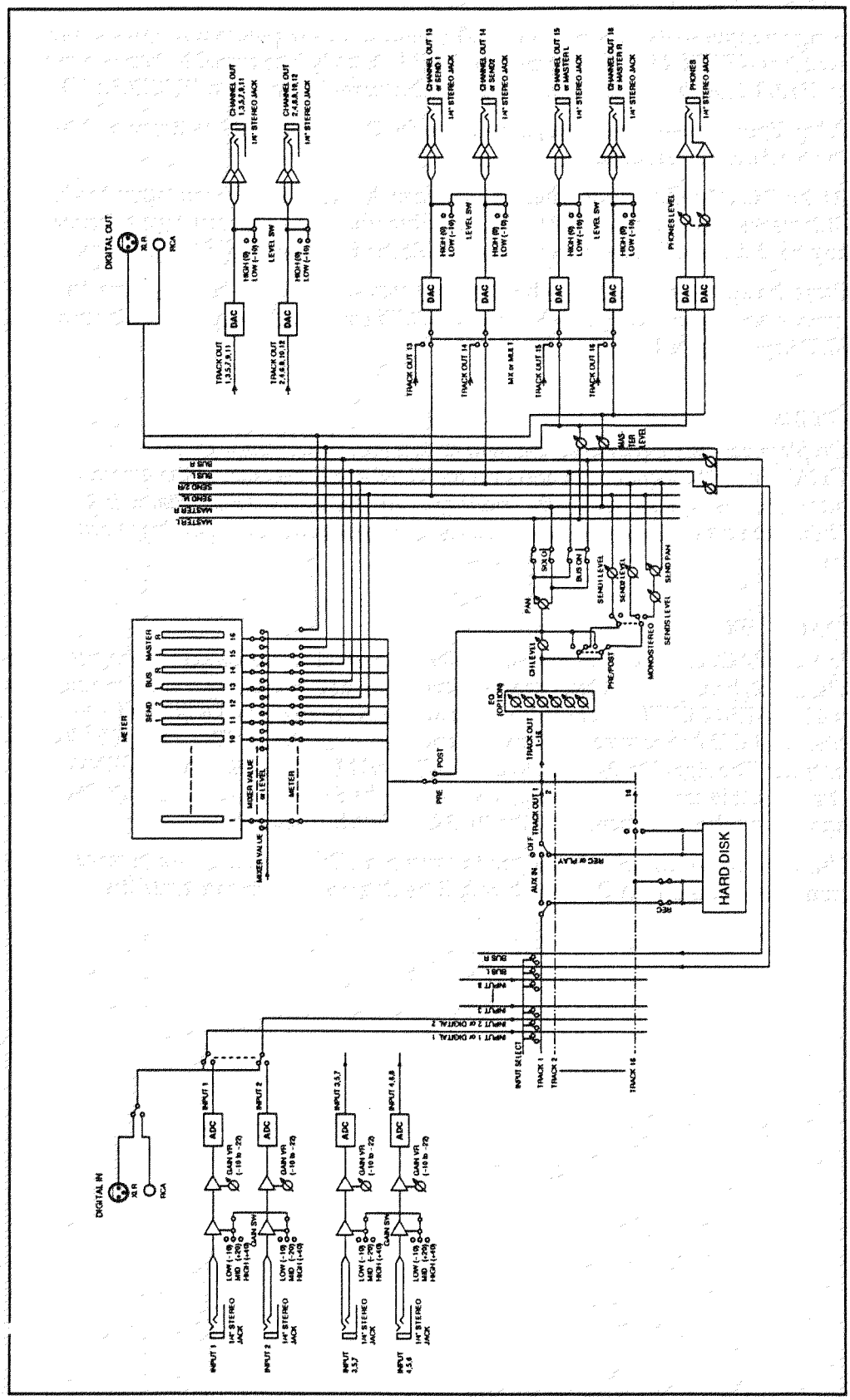
The DR16 is a 16-track digital hard disk recorder and editor, with a built-in digital mixer. It contains many of the features and functions you would normally expect, such as CD quality audio, non-destructive editing, etc., but unlike computer-based systems, the DR16 is as easy to use as an ordinary multi-track tape recorder.

Features

- 16-track hard disk recorder with familiar multi-track recorder (MTR) operation.
- 16-channel programmable digital mixer with snapshot and fade automation.
- 18-bit 64-times oversampling A/D converters.
- 20-bit 8-times oversampling D/A converters for Master and Send outputs and 18-bit 8-times oversampling D/A converters for Track 1-12 outs.
- 16-bit linear PCM recording.
- 17 track minutes per 100MB of hard disk (fs @ 48 kHz).
- Up to six SCSI hard disks can be connected.
- Instant playback start.
- Near-instant data access, no time consuming rewinds, etc.
- Autolocator with 100 locate points.
- Absolute and relative time modes, with sync offset.
- Beat/tempo map for MIDI Clock synchronize operation.
- MMC, MTC supported.
- Adjustable preroll.
- Varispeed playback.
- Punch in/out includes: manual, auto (with rehearsal), and footswitch.
- Jog/shuttle control for locating edits.
- Take functions allow you to select from five different recordings.
- Non-destructive editing functions include: copy, copy+insert, move, move+insert, erase, delete, slip, insert, and edit undo.
- Balanced 1/4 inch phone jack analog inputs and outputs.

- Output mode is selectable for 16 individual channels or two stereo master and two send outputs.
- XLR and RCA/phono digital inputs and outputs (AES/EBU or S/PDIF).
- Backup to DAT via digital I/O or to ADAT via optional IB-804A ADAT interface board.
- Multi unit operation of DR16 and DR8 via remote terminal.
- Optional MT8 Mixing Tab for easier mixer setting.
- Stored data is compatible with Akai DR8 and Akai DD1500.
- Optional IB-801S SCSI-B interface board allows you to connect the DR16 to personal computers and other peripheral devices.
- Optional IB-802T SMPTE reader/generator board for time-code synchronization.
- Optional IB-803M MIDI interface board for MIDI sequencer synchronization.
- Optional IB-804A ADAT interface board for digital data transfer between Alesis™ ADATs.
- Optional IB-805R RS422 interface board for master/slave operation via RS422.
- Optional IB-806B Bi-Phase interface board for bi-phase synchronization.
- Optional digital EQ board.

Signal Flow


DIGITAL OUT
XLR
RCA
CHANNEL OUT 1,3,5,7,9,11 1/4" STEREO JACK
CHANNEL OUT 2,4,6,8,10,12 1/4" STEREO JACK
CHANNEL OUT 13 or REMO 1 1/4" STEREO JACK
CHANNEL OUT 14 or SEND2 1/4" STEREO JACK
CHANNEL OUT 15 or MASTER L 1/4" STEREO JACK
CHANNEL OUT 16 or MASTER R 1/4" STEREO JACK
PHONES 1/4" STEREO JACK
PHONES LEVEL
HIGH (0) LOW (-10) LEVEL SW
DAC
TRACK OUT 1,3,5,7,9,11
TRACK OUT 2,4,6,8,10,12
TRACK OUT 13
TRACK OUT 14
MIX or MIX 1
TRACK OUT 15
TRACK OUT 16
MAS TER LEVEL
MASTER R
MASTER L
SEND 2/R
SEND 1/L
BUS R
BUS L
PAN
SOLO
BUS ON
SEND1 LEVEL
SEND2 LEVEL
SEND PAN
SENDS LEVEL
MONO/STEREO
PRE/POST
CH LEVEL
EQ (OPTION)
TRACK OUT LEVEL
METER
MASTER
BUS
SEND
MIXER VALUE or LEVEL
PRE
POST
HARD DISK
REC or PLAY
REC
AUX IN
TRACK OUT
INPUT SELECT
TRACK 1
TRACK 2
TRACK 16
INPUT 1 or DIGITAL 1
INPUT 2 or DIGITAL 2
INPUT 3
INPUT 4
DIGITAL IN
ADC
INPUT 1
INPUT 2
INPUT 3,5,7
INPUT 4,6,8
GAIN VR (-10 to +20)
GAIN SW
LOW (-10) MID (+20) HIGH (+40)
1/4" STEREO JACK

Description of Signal Flow

Input

A signal input to the ANALOG INPUT channels 1 to 16 passes through the gain switches (HIGH, MID, LOW) and the GAIN controls. The signal is then converted to digital. Pressing the DIGI key will switch channels 1 and 2 to DIGITAL I/O - IN.

After digital conversion, the signal goes to the INPUT SELECT switches and then to the hard disk for recording.

At the INPUT SELECT switches, input channels 1 to 8 usually correspond to hard disk tracks 1 to 8 and tracks 9 to 16. However, you can assign any input channel to any hard disk track, plus you can also select the BUS L and BUS R signals as input.

Press the appropriate TRACK REC keys to record data to the hard disk tracks. You need to set the recording levels with the GAIN controls. Then press the Play and REC keys to record.

Output

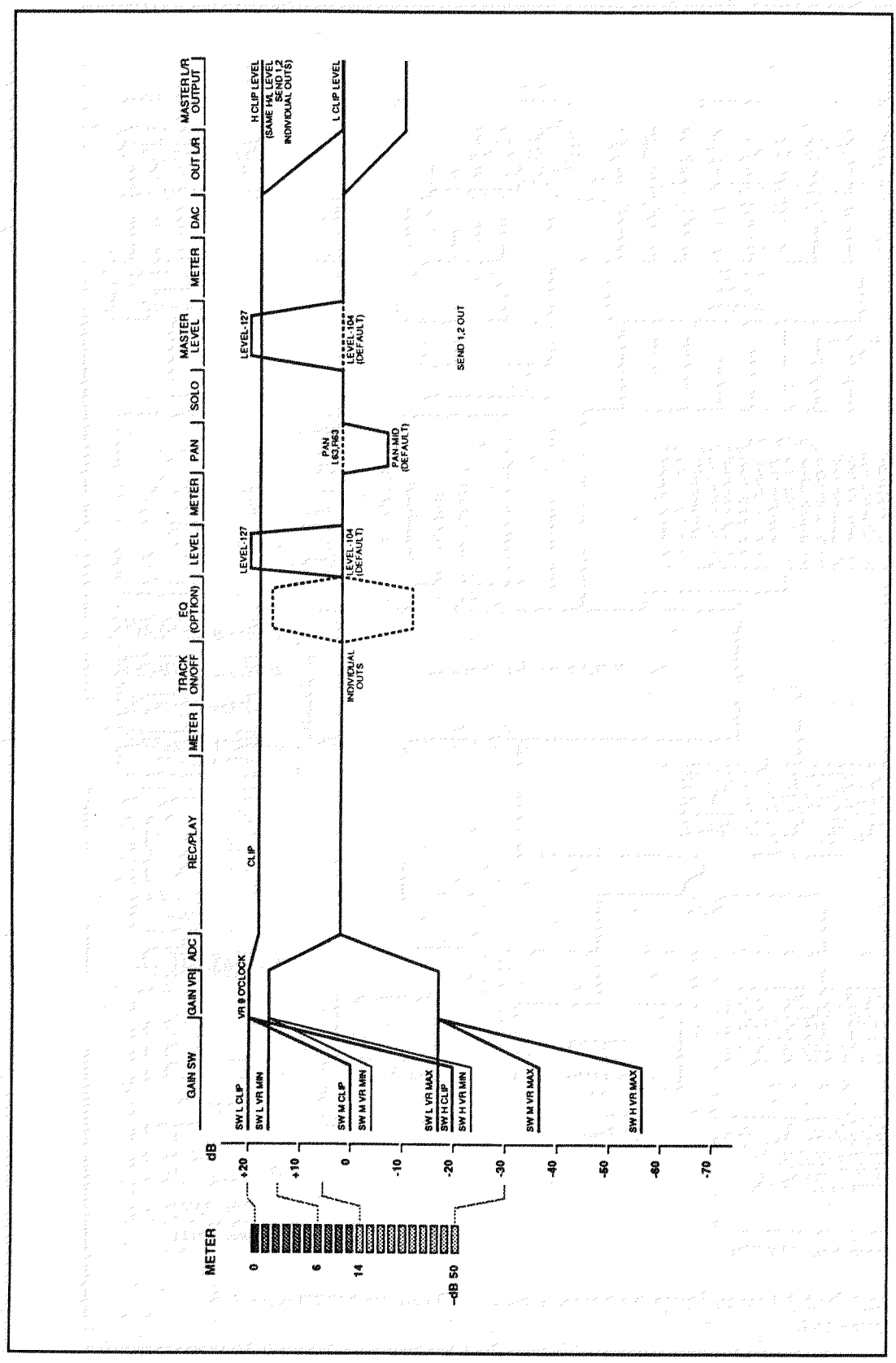
On playback, the signal from the hard disk tracks passes through the CHANNEL ON keys 1 to 16 and into the TRACK MIX section of the mixer. In addition, the signal is sent to the individual ANALOG OUTPUT channels 1 to 16. Unlike the inputs, these output channels are fixed to the corresponding hard disk tracks.

TRACK MIX

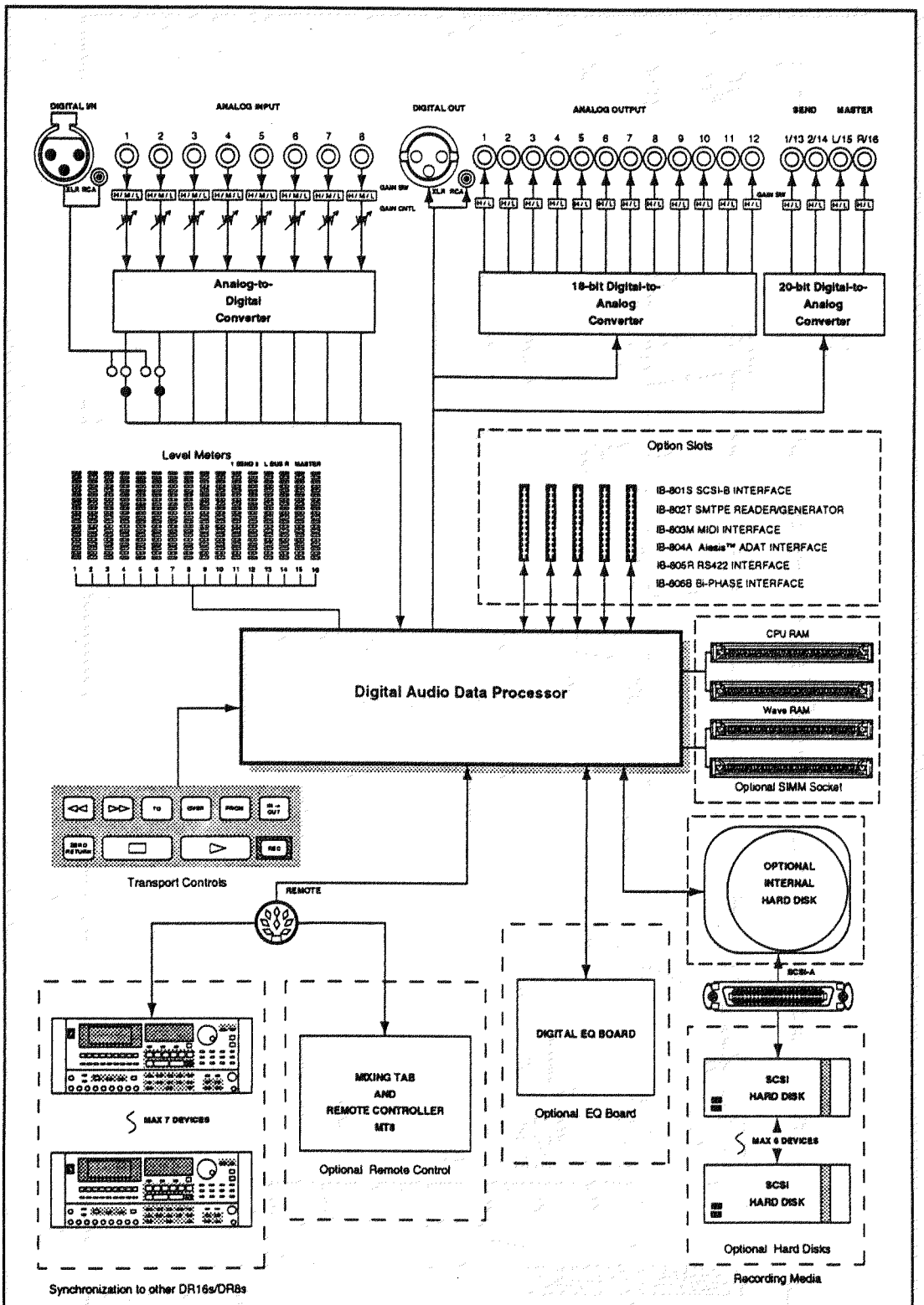
In the TRACK MIX section, the signal passes through the equalizer (if the optional digital EQ board is installed), channel level, pan, and effects send. It is then sent to the MASTER LEVEL where it is output in digital through the DIGITAL I/O - MASTER OUT or converted to analog and then to the MASTER L/R or PHONES outputs. The signal is also sent to the SEND and BUS channels. On the SEND channels, it is converted to analog and sent to the SEND 1/L-2/R outputs. It only appears on the BUS channels if the BUS ON switch is selected.

Using the BUS channels allows you to carry out a digital bounce-down recording (ping-pong) inside the DR16 with very little deterioration in tonal quality.

Level Diagram



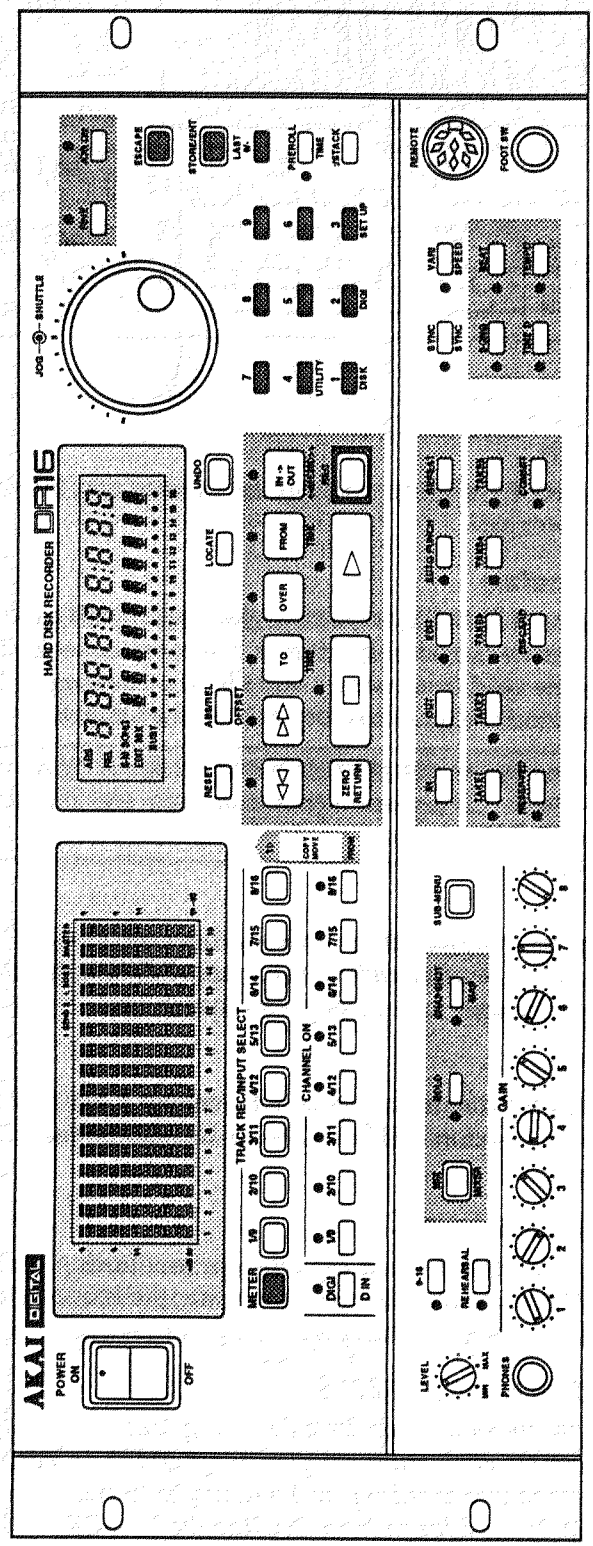
Inside the DR16

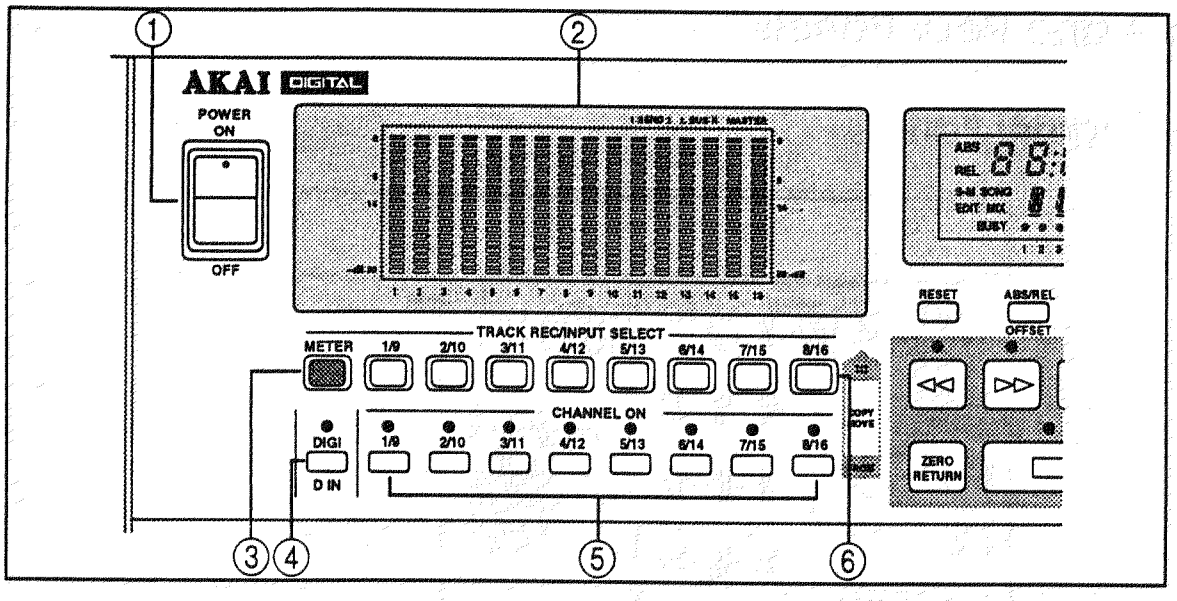


The DR16HD model has an internal hard drive as standard. The model number is printed on the rear panel.

1 Front and Rear Panels

Front Panel





1) POWER switch

The rocker part of the power switch is recessed in the ON position to prevent accidental power off.

2) Peak Level meters

These 20-segment FLD (Fluorescent Light Display) bargraphs with peak hold indicate the playback and source levels. There are sixteen track level indicators that also indicate the send, bus routing, and stereo master levels. The bargraphs are used to display channel parameter settings when the DR16 is in Mix Mode.

> Note: *These meters are after the A/D converters in the signal path. Therefore when the amber 0 dB (Peak) FLD segment lights, it indicates digital distortion. You should adjust the levels so this never occurs.*

3) METER key

This key toggles the level meter indicator between channel and master. Normally, the level meter shows the level of each track. Pressing the METER key changes tracks 11-16 indicators to send, bus, and master level indicators.

4) DIGI(D IN) key

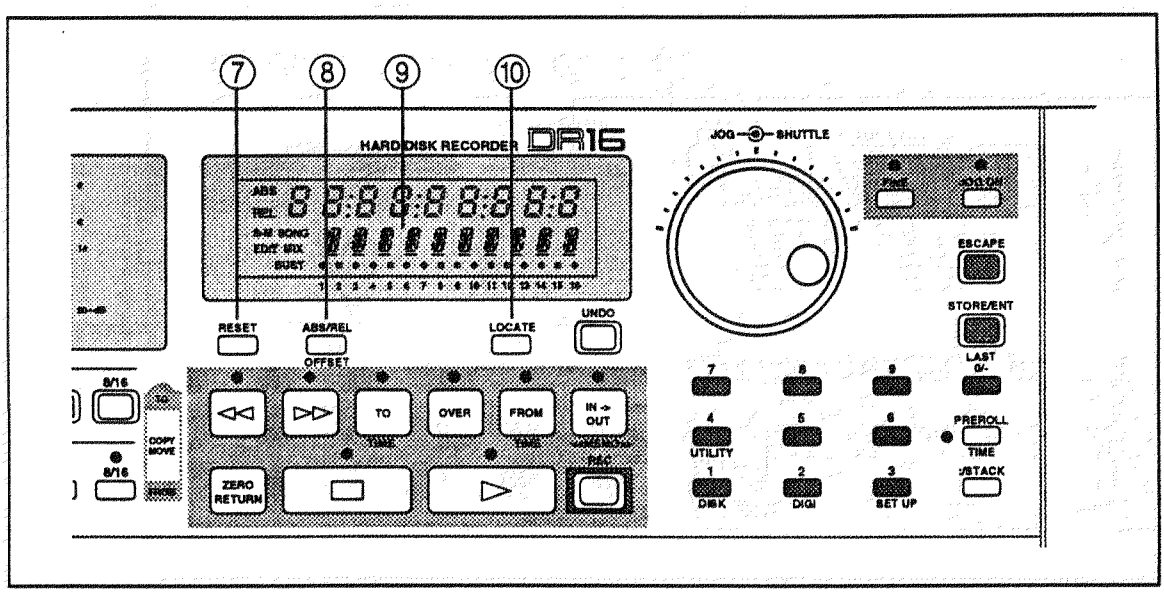
This key selects digital inputs for input channels 1 and 2. Select the XLR or the RCA/phono connectors with the DIGI(D IN) sub-menu function. See "Digital Inputs" on page 35.

5) CHANNEL ON keys 1/9 ~ 8/16

These keys allow you to select channels for monitoring. See "Track Number Limitations" on page 46. When you are using the Mix Mode, these keys select the channel you want to edit. Also see "Selecting Mix Mode" on page 64.

6) TRACK REC(INPUT SELECT) keys 1/9 ~ 8/16

These keys are used to arm tracks for recording ("Arming Tracks" on page 41) or to select auxiliary inputs ("Setting an Auxiliary Input" on page 68.) A flashing key indicates that a track is armed for recording, and a lit key indicates recording in progress. Assign the input channel for each track using the TRACK REC (INPUT SELECT) sub-menu function ("Selecting the Input Channels" on page 38).



7) RESET key

This key is used to reset the relative time to zero. If it is pressed while an absolute time is displayed, relative time will be selected automatically, just like pressing the ABS/REL key.

8) ABS/REL(OFFSET) key

This key switches the display between absolute time and relative time. Absolute time starts at zero, cannot be changed, and works as the base time for relative time. When synchronizing using SMPTE timecode, the relative mode can be used to set synchronization offsets.

Set the offset for relative time with the ABS/REL(OFFSET) sub-menu function.

9) Time and Status display

This custom FLD (Fluorescent Light Display) shows recording time information and messages indicating the system status.

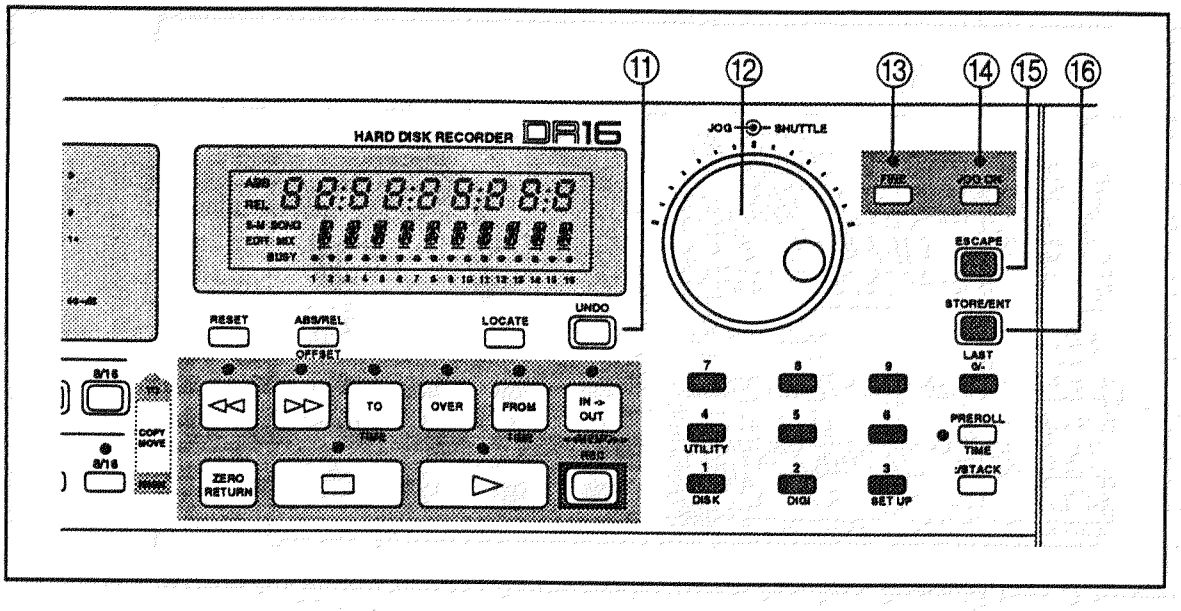
The top row of nine 7-segment digits display time, either absolute or relative. It may also be switched to show bars, beats, and clocks.

The bottom row of 14-segment digits display status, sub-menu, and error messages. Also in this display, the current mode is displayed.

The "**BUSY**" indicator at the bottom of the display shows hard disk activity. Beside it, a row of small dots show activity for each of the 16 tracks and indicate that data exists on the track at the current position.

10) LOCATE key

This key is used to enter locate time values. See "Locate Functions" on page 81 and "Specifying the "in" Point and "out" Point" on page 28



11) UNDO key

This key allows you to undo the last recording or edit. This is useful if you make a mistake while recording and want to return to the previous recording. Likewise, when editing you can compare the material before and after an edit. See "Recording Undo" on page 49 and "Undoing an Edit" on page 92.

12) JOG/SHUTTLE control

The inner JOG wheel allows you to locate while listening to a recording. Playback speed is determined by how fast you turn the wheel. Turn it counterclockwise to review and clockwise to preview. The effect is similar to reel-rocking on an analog tape recorder — you can use it to identify edit points precisely. In certain modes such as MIX, SONG and SUB-MENU, this wheel is also used for data entry. Turn it counterclockwise to decrease values and clockwise to increase them.

Like the JOG wheel, the outer SHUTTLE control also allows you to locate while listening to a recording. The playback speed is determined by the angle at which you hold the control. Turn it counterclockwise to review and clockwise to preview. The SHUTTLE control is also used to move the cursor (input point) when setting certain parameter values. See "Cursor" on page 27.

13) FINE key

This key allows you to increase the resolution of the jog wheel for more precise selection of time location points.

14) JOG ON key

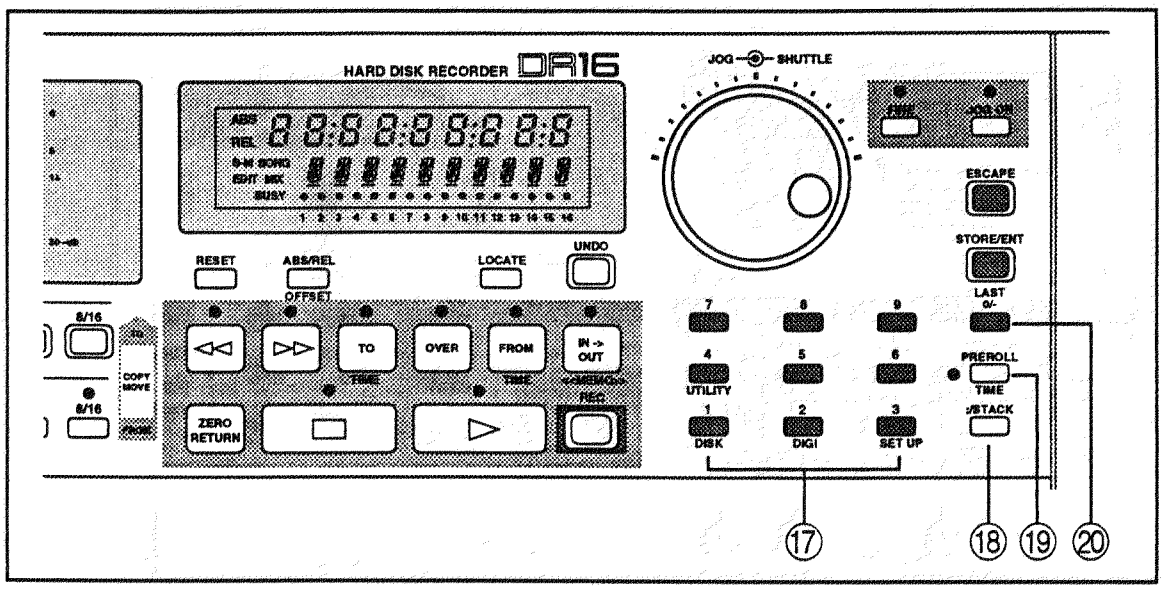
This key allows you to switch the JOG/SHUTTLE control on and off. When the LED is lit, the JOG/SHUTTLE control can be used to locate while listening to a recording. Otherwise, the JOG/SHUTTLE control cannot be used to locate.

15) ESCAPE key

This key can be used to escape from the current edit or sub-menu function.

16) STORE/ENT key

This key is used when entering and storing time values, executing edit functions, etc.



17) Numeric keypad - 1(DISK), 2(DIGI), 3(SET UP), 4(UTILITY), 5, 6, 7, 8, 9

These keys are used to store and recall direct locate points, enter time values, and set parameter values.

You can perform a variety of operations on the hard disk with the 1(DISK) sub-menu functions.

Set the sampling frequency and other related functions with the 2(DIGI) sub-menu functions.

Adjust the display brightness, drop the sub-frame notation, and assign MIDI controller numbers with the 3(SET UP) sub-menu functions. See "System Set up" on page 147.

The 4(UTILITY) sub-menu functions are used for data exchange between the DR16 and the DR8 or DD1500.

18) :/STACK key

This key is used to enter and recall the 100 stack locate points (00-99). It is also used as a shortcut during locate data entry. See "Stack Locate Points" on page 83.

19) PREROLL(TIME) key

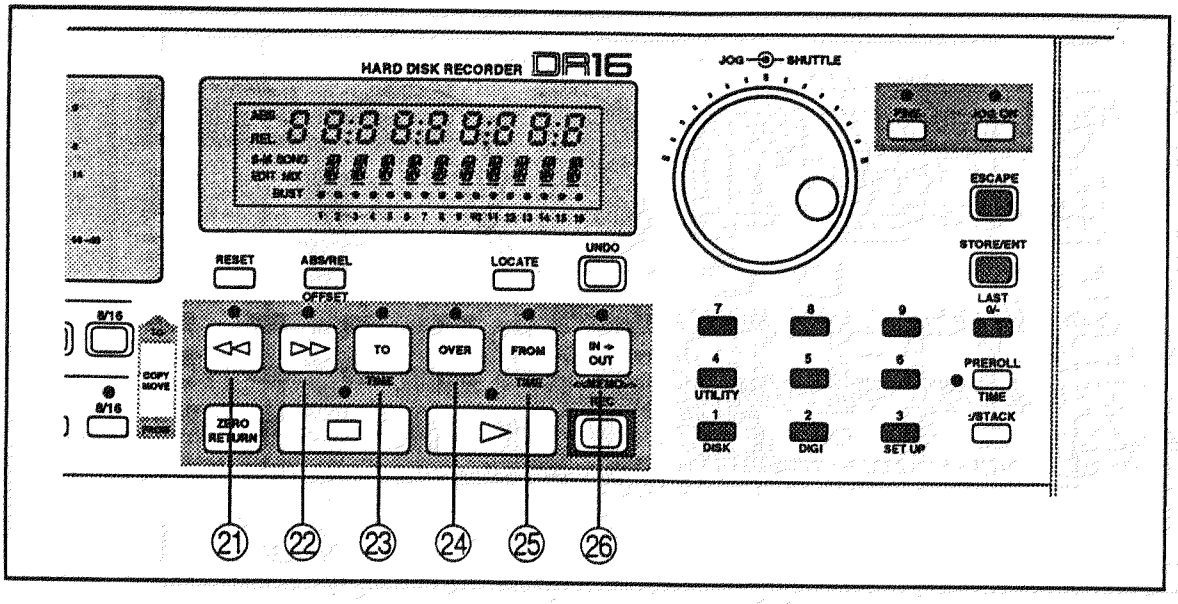
This key is used to switch on the preroll function. Preroll allows you to locate to a point a few seconds before a specified point, for example, to provide a count-in to an overdub. See "Preroll" on page 85.

The preroll value is set using the PREROLL(TIME) sub menu function.

20) LAST 0/- key

This key is used to locate to the last two points at which the stop key was pressed. Press the key once to locate to the last point at which the stop key was pressed. Press again to locate to the previous point. See "Last Memory" on page 84.

This key is also used for entering time and parameter values, and entering negative values.



21) Rewind ⏪ key

This key is like the rewind key found on most conventional tape recorders. In stop mode, it activates time display fast rewind.

22) Fast Forward ⏩ key

This key is like the fast forward key found on most conventional tape recorders. In stop mode, it activates time display fast forward.

23) TO(TIME) key

This key will start playback at a specified number of seconds before the current position, i.e., the currently displayed time. The default is one second. Playback will stop when the current position is reached. The number of seconds can be specified in the TO(TIME) sub-menu function.

24) OVER key

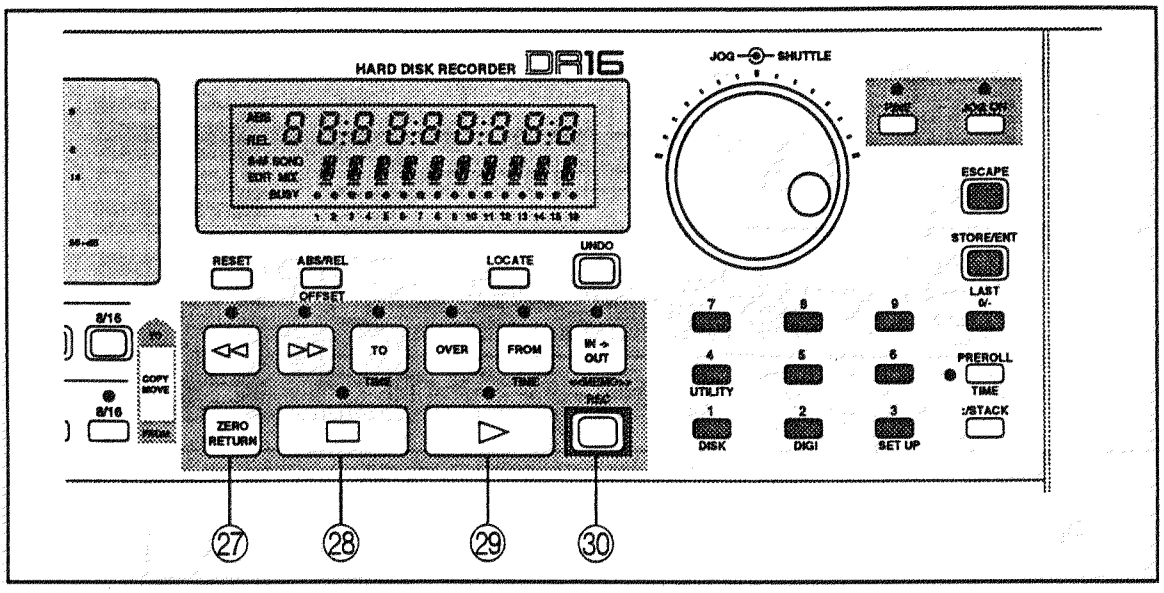
This key will start playback at a specified number of seconds before the current position. Playback will stop the same number of seconds beyond the current point. The default is one second before and one second after the current point. The number of seconds are specified with the TO(TIME) and FROM(TIME) sub-menu functions.

25) FROM(TIME) key

This key will start playback at the current position. Playback will stop a specified number of seconds beyond the current point. The default is one second. The number of seconds can be specified in the FROM(TIME) sub-menu function.

26) IN->OUT(<<MEMO>>) key

This key will start playback from the current "in" point to the current "out" point. You set these points with "IN key""OUT key" on page 16. After playback, the DR16 returns to the original time. You can save up to nine specific "in" and "out" points with the IN->OUT(<<MEMO>>) sub-menu function. See "Using the <<MEMO>> function" on page 29.



27) ZERO RETURN key

In absolute mode, this key will locate to the absolute 0 0:0 0:0 0:0 0.0 point.

In relative mode, it will locate to the relative 0 0:0 0:0 0:0 0.0 point.

28) Stop ▭ key

This key is used to stop playback, recording, fast forward, and rewind.

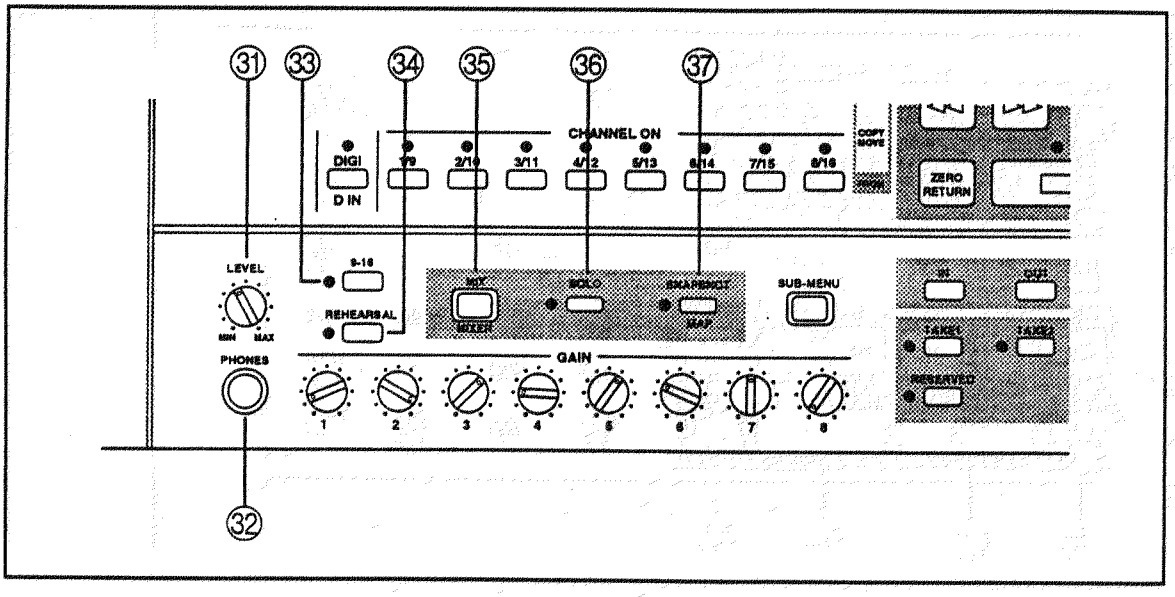
When Stop is pressed, the last two stop points are stored in memory. You can use the LAST 0/- key to switch between the last two stop points.

29) Play ▷ key

This key is used to start playback. Pressing this key while holding down the REC key will start recording.

30) REC ◯ key

This key (in combination with the Play key) is used to start recording. It flashes when the DR16 is in record-ready mode (TRACK REC keys have been selected) and lights up while recording is in progress.



31) Phones LEVEL

This control adjusts the headphone volume level.

32) PHONES connection

A stereo pair of headphones can be connected to this 1/4 inch stereo phone jack.

33) 9 ~ 16 key

This key toggles the TRACK REC keys and the CHANNEL ON keys between selecting tracks or channels 1~8 and 9~16.

34) REHEARSAL key

This key turns the rehearsal function on and off. Rehearsal allows you to practice punch-ins and -outs. During a rehearsal, the monitor will switch to source at the punch-in point, but nothing will be recorded. See "Rehearsal" on page 48.

35) MIX(MIXER) key

This key allows you to configure the mixer — set the level, pan and auxiliary send levels for each channel. See "Mixer" on page 63.

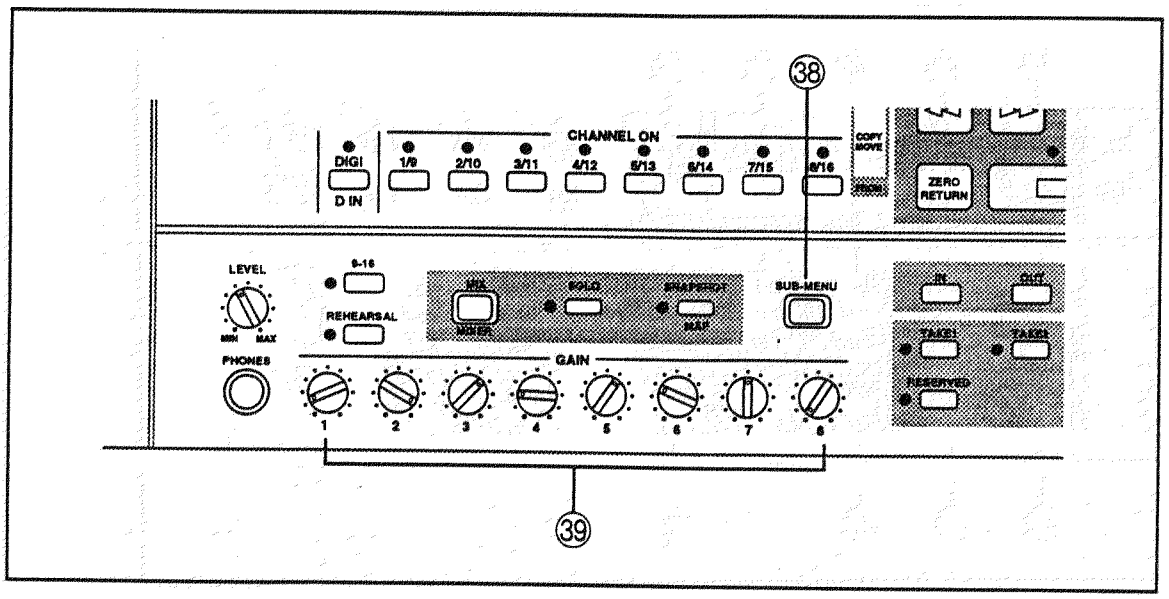
Set global mixer parameters such as the master level, auxiliary send types, and metering parameters with the MIX(MIXER) sub-menu function. See "System Settings" on page 69.

36) SOLO key

This key allows you to isolate individual channels. Pressing one of the CHANNEL ON keys will switch off all other tracks, so that you may listen to the selected track in isolation. You can select more than one track at a time. See "Solo Function" on page 75.

37) SNAPSHOT(MAP) key

This key allows you to store a mix as a 'snapshot'. Once stored, this key is used to recall snapshot mixes. See "Snapshot Settings" on page 72.



38) SUB-MENU key

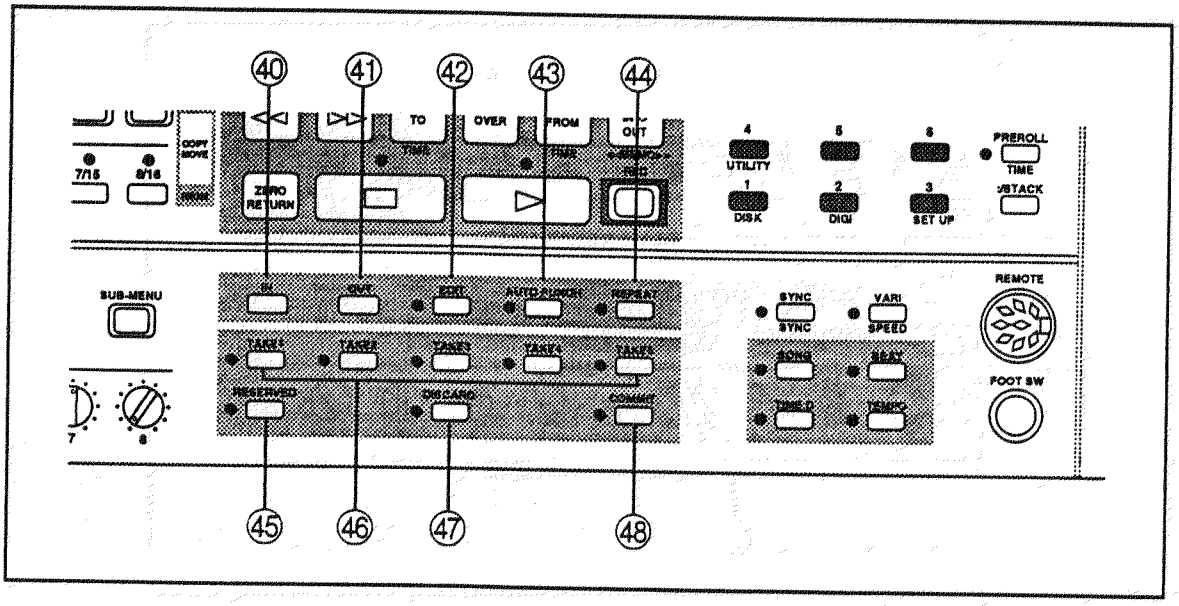
This key is used to select sub-menu functions. Many of the keys have sub-menu functions (indicated in amber, usually beneath the key).

To select a sub-menu function, press the SUB-MENU key (the indicator in the key will flash and the text `SUB-MENU` will appear on the display), then press the desired key. While the DR16 is in Sub-Menu mode, the amber "**S-M**" indicator will be lit on the display.

39) GAIN controls

These controls allow you to set the level of the eight analog inputs on the rear panel.

> **Note:** *The settings of these controls are not stored as part of a mixer snapshot. See "Storing a Snapshot" on page 72.*



40) IN key

This key sets the DR16 to the "in" point. To store an "in" point, first press the STORE/ENT key (this marks the time) and then press the IN key.

41) OUT key

This key sets the DR16 to the "out" point. To store an "out" point, first press the STORE/ENT key and then press the OUT key.

42) EDIT key

This key is used to select the edit functions. See "Editing" on page 91.

43) AUTO PUNCH key

This key is used to automatically control recording punch-in and punch-out. See "Auto Punch-In/Out" on page 45.

44) REPEAT key

This key is used to repeat playback. When this key is on, the part between the "in" point and the "out" point will be played back repeatedly. See "Repeat" on page 59.

45) RESERVED key

This key assigns a recording or edit to one of the TAKE keys.

46) TAKE1 to TAKE5 keys

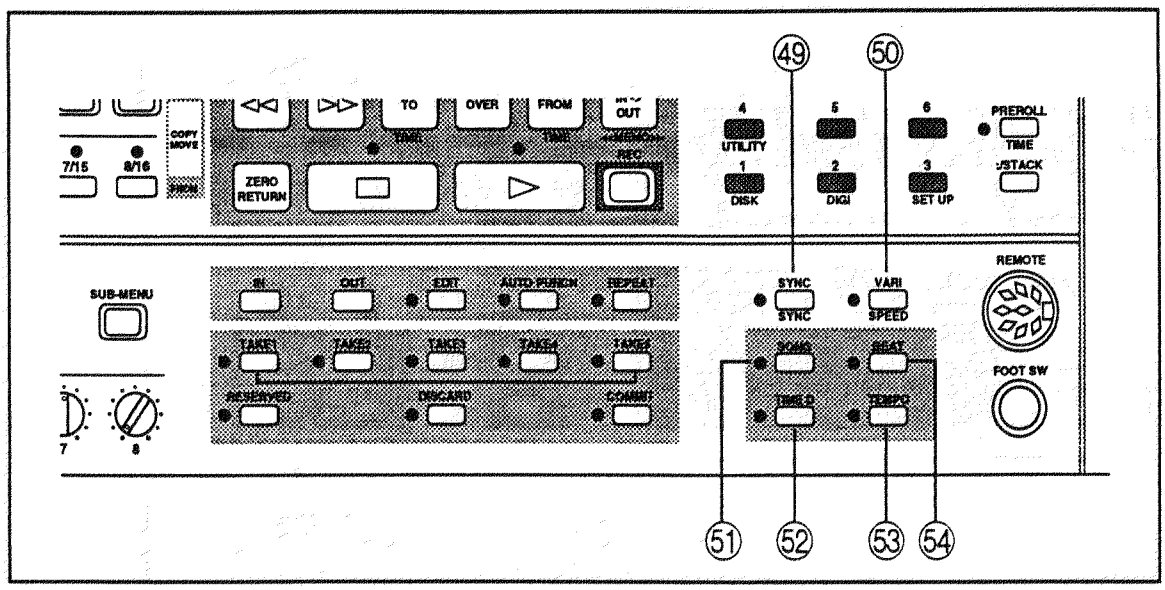
These keys are used to keep the last 5 recordings. See "Take Functions" on page 77.

47) DISCARD key

This key allows you to delete the contents of one of the TAKE keys.

48) COMMIT key

This key saves the "perfect" take to the hard disk tracks.



49) SYNC(SYNC) key

This key is used to activate synchronization with an external device. Up to seven DR16s or DR8s can be synchronized using Akai AL-X50 cables. The optional IB-802T SMPTE reader/generator board is required for SMPTE synchronized operation; the optional IB-803M MIDI interface board is required for MIDI operation; the optional IB-805R RS422 interface board is required for RS422 operation; and the optional IB-806B Bi-Phase interface board is required for bi-phase operation.

Select the type of external device to sync to with the SYNC(SYNC) sub-menu function. See "SMPTE/EBU Synchronization" on page 133 and "MIDI Synchronization" on page 136.

50) VARI(SPEED) key

This key switches on the varispeed function for playback. See "Varispeed" on page 61.

The amount of varispeed is set using the VARI(SPEED) sub-menu function.

51) SONG key

This key switches the display to BBC mode: Bar, Beat, Clock. This mode is mainly used when the DR16 is synchronized to a MIDI Clock (MTC) signal with the optional IB-803M MIDI interface board. See "Song Mode" on page 139.

52) TIME D key

This key is used to switch to normal time display (hours, minutes, seconds, frames) when the DR16 is in BBC mode.

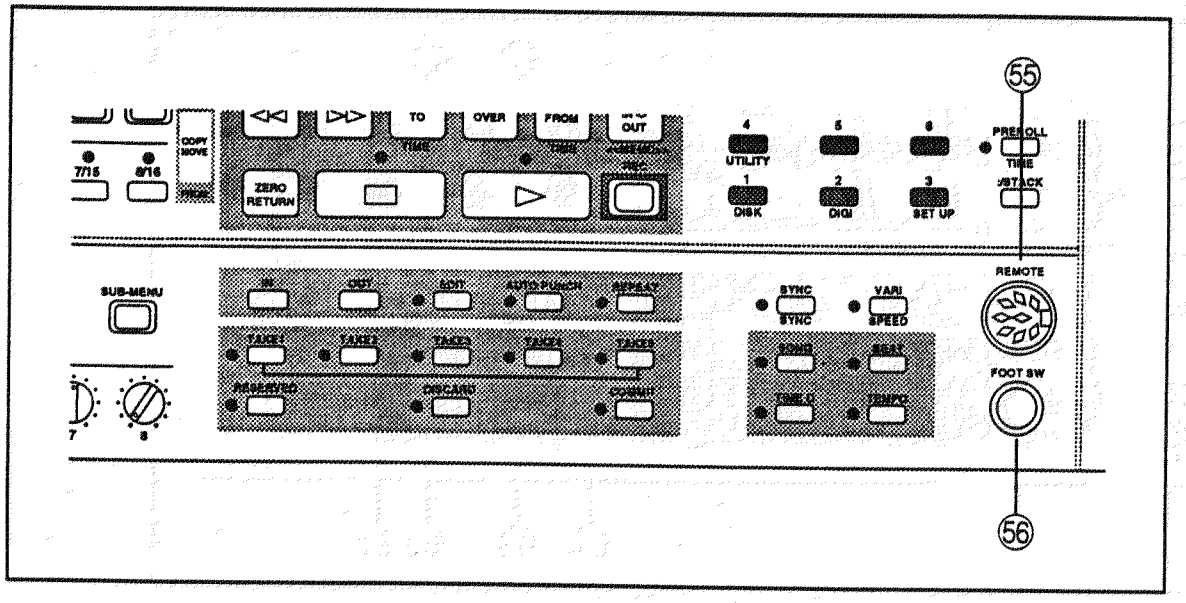
53) TEMPO key

This key is used to set the tempo when the DR16 is in BBC mode.

You may also use this key to input tempo changes. When an external sequencer is slaved to the DR16, it will be able to follow tempo changes.

54) BEAT key

This key is used to set the time signature when the DR16 is in BBC mode.



55) REMOTE connection

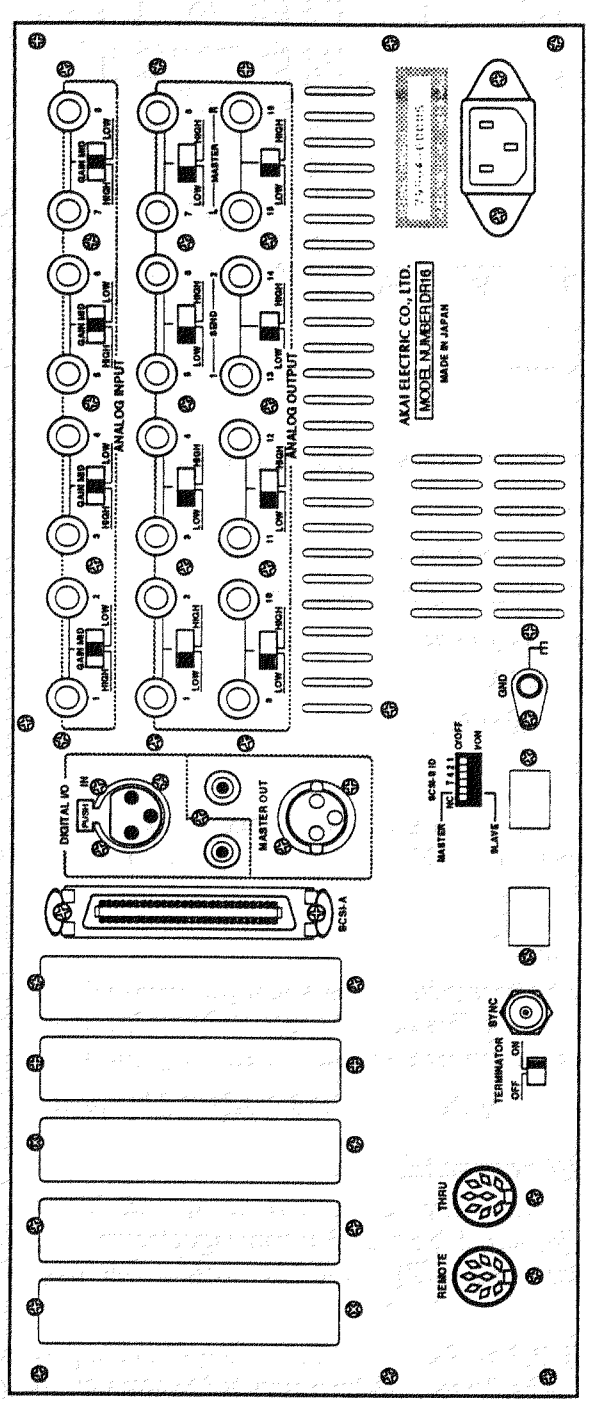
This connection is used for connecting the optional MT8 mixing tab, a DR8, or another DR16.

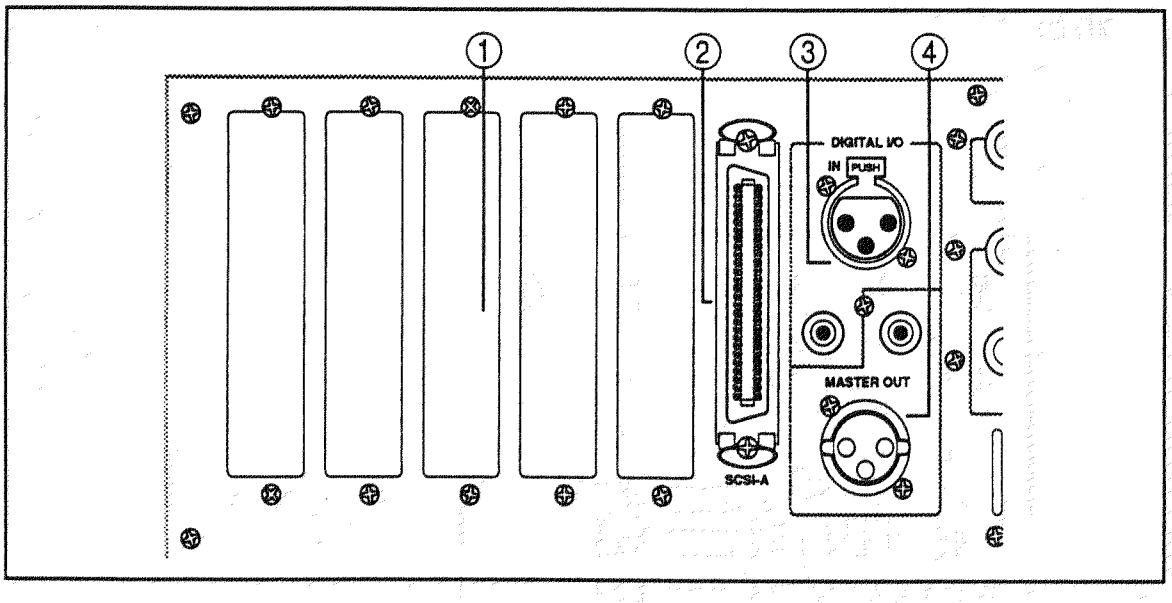
> **Note:** *Use only AKAI AL-X50 remote cables for REMOTE connections.*

56) FOOT SW connection

A normally closed type footswitch can be connected here for punch-in and punch-out operation.

Rear Panel


ANALOG INPUT
ANALOG OUTPUT
MASTER
SEND
AKAI ELECTRIC CO., LTD.
MODEL NUMBER DR16
MADE IN JAPAN
DIGITAL I/O
IN
PUSH
MASTER OUT
SCSI-A
SCSI-B ID
MASTER
SLAVE
ON/OFF
GND
SYNC
TERMINATOR
ON
OFF
THRU
REMOTE



1) Option slots

These slots are for installing the following optional interface cards:

- IB-801S SCSI-B interface board
- IB-802T SMPTE reader/generator board
- IB-803M MIDI (IN/OUT/THRU) interface board
- IB-804A Alesis ADAT interface board
- IB-805R RS422 interface board
- IB-806B Bi-Phase interface board

2) SCSI-A connection

For increased recording time, up to six external SCSI hard disks can be connected to this connection (up to seven if the DR16 contains no internal hard disk). See "Hard Disks" on page 109.

3) DIGITAL I/O - IN connectors

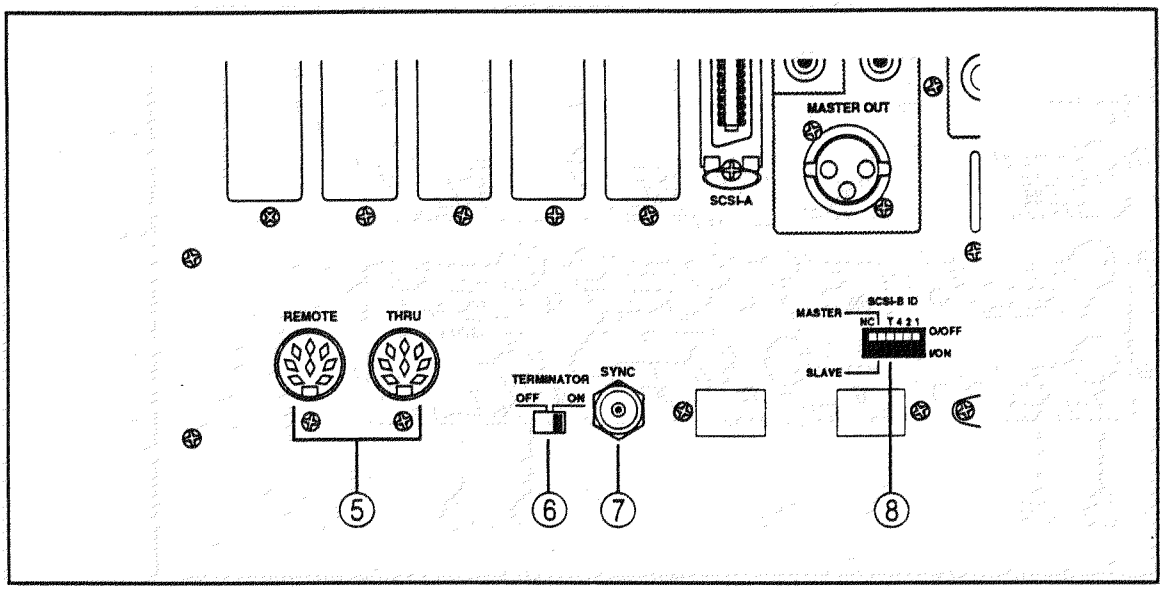
These XLR and RCA/phono connectors are used to input AES/EBU and S/PDIF format digital signals respectively. The active input connector is selected using the DIGI(D IN) key sub-menu function. See "Digital Inputs" on page 35.

The digital input signals are fed to channels 1 and 2, selected by the DIGI key.

4) DIGITAL I/O - MASTER OUT connectors

These XLR and RCA/phono connectors are used to output AES/EBU and S/PDIF format digital signals. The format of the digital output signal is set to Type I or Type II digital audio outputs using the 2(DIGI) sub-menu function. See "Digital Outputs" on page 53.

The digital outputs are a digital duplication of the analog signal appearing at the OUTPUT - MASTER OUT jacks. These may be connected to any stereo digital audio recorder, such as a DAT machine, to perform a completely digital mixdown. You can also use these connections to perform a DAT back-up. See "Backup to DAT" on page 125.



5) REMOTE and THRU connections

These connections are used for connecting and synchronizing other DR16s. Up to seven DR16s can be connected for 128-track operation.

Note: *Use only AKAI AL-X50 remote cables for REMOTE and THRU connections.*

6) TERMINATOR switch

This switch selects 75Ω termination for the SYNC connection. When a video signal is connected, this switch must be set to ON.

7) SYNC connection

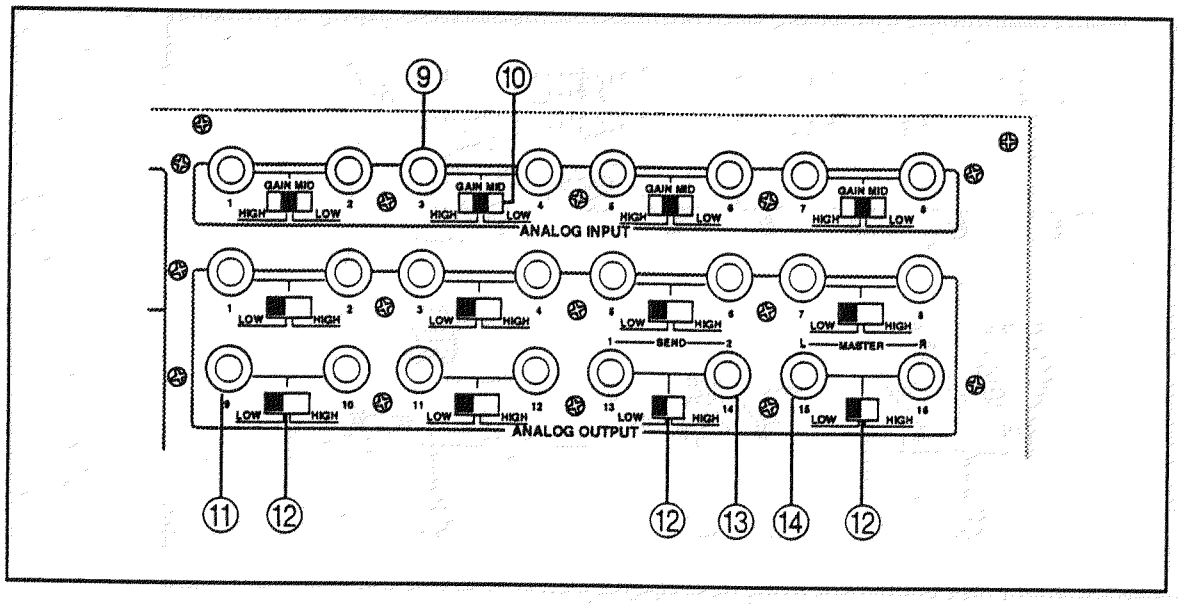
This BNC connector is used to connect the DR16 to an external digital clock source, a composite color video signal, or a black burst signal. Use the 2(DIGI) sub-menu function to select wordclock or a variety of video sync options.

8) SCSI-B ID switches

This DIP switch is for use with the optional IB-801S SCSI-B interface board. It is used to set the DR16's SCSI ID and termination for SCSI-B bus. This bus is for connecting to personal computers.

This switch has no effect on SCSI-A bus.

The switch is also used to select MASTER or SLAVE status for connecting and synchronizing DR16s via the REMOTE and THRU connections.



9) ANALOG INPUT (1 ~ 8) connectors

These 1/4 inch stereo phone jacks are used to input analog signals to the DR16. They accept balanced and unbalanced signals: Tip = hot, ring = cold, sleeve = ground. Unlike conventional multi-track recorders, the eight inputs are not 'hardwired' to their corresponding tracks but can be assigned to any track you like.

10) Input gain switches

These switches allow you to set the DR16 input gain. They can be set to LOW (0 dB), MID (+20 dB), or HIGH (+40 dB). Input gain switches are provided for each pair of channels: channels 1/2, channels 3/4, channels 5/6, and channels 7/8.

11) ANALOG OUTPUT (1 ~ 12) connectors

These 1/4 inch stereo phone jacks are used to output analog signals from the DR16. They can be used balanced or unbalanced: Tip = hot, ring = cold, sleeve = ground.You set the output gain for these connectors with the level switch (12). They can be set to LOW (-10 dBu) or HIGH (+4 dBu).

12) Output level switches

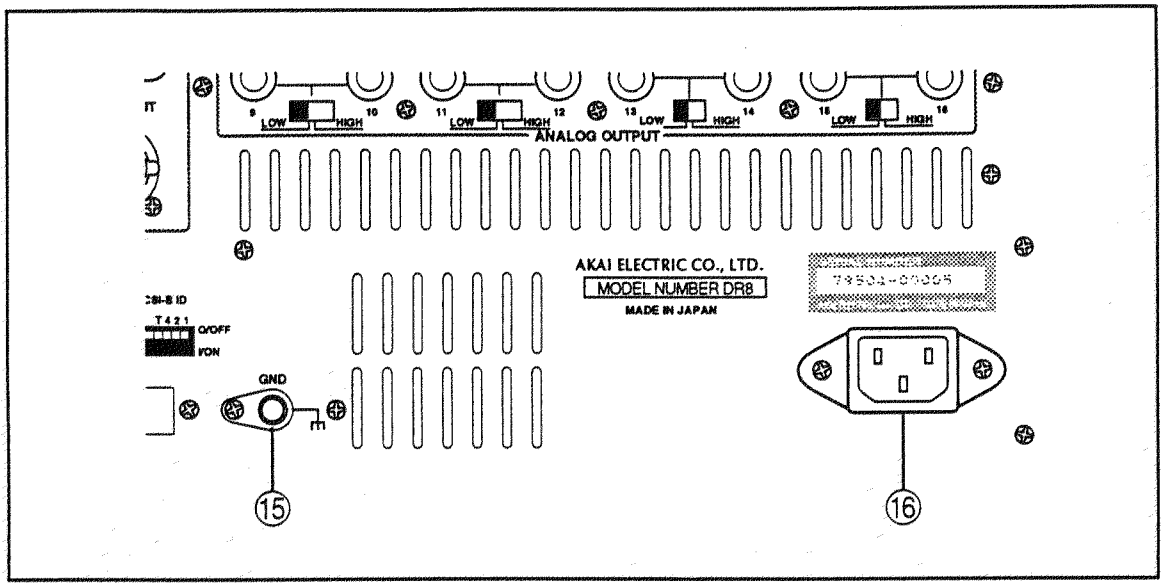
These switches allow you to set the DR16 output level. They can be set to LOW (-10 dBu) or HIGH (+4 dBu). Output level switches are provided for each pair of channels: channels 1/2, channels 3/4, channels 5/6, channels 7/8, channels 9/10, channels 11/12, channels 13/14, and channels 15/16.

13) ANALOG OUTPUT 13, 14 - SEND 1/2 connectors

These 1/4 inch stereo phone jacks carry the individual analog tracks 13 and 14 or the two effects or auxiliary sends in MIX mode. They can be used balanced or unbalanced: Tip = hot, ring = cold, sleeve = ground. You set the output gain for these connectors with the level switch (12). They can be set to LOW (-10 dBu) or HIGH (+4 dBu).

14) ANALOG OUTPUT 15, 16 - MASTER L/R connectors

These 1/4 inch stereo phone jacks are used to output the individual analog tracks 15 and 16 or an analog stereo mix of the 16 tracks in MIX mode. This is an analog duplication of the digital signal appearing at the DIGITAL I/O - MASTER OUT output jacks. They can be used balanced or unbalanced: Tip = hot, ring = cold, sleeve = ground. You set the output level for these connectors with the level switch (12). They can be set to LOW (-10 dBu) or HIGH (+4 dBu).

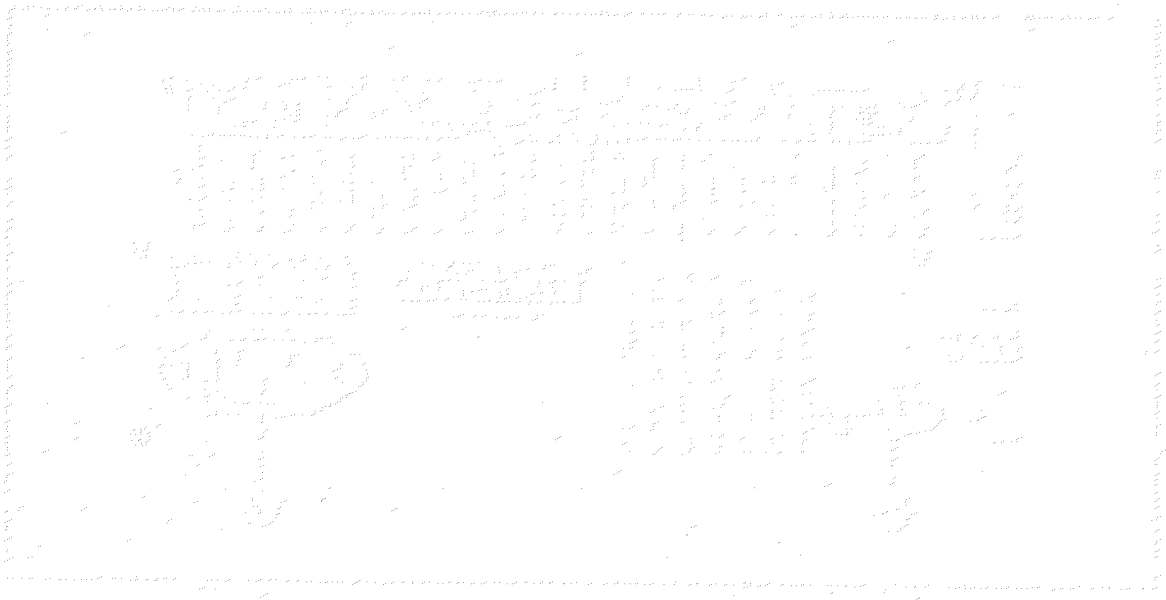


15) GROUND

Use this post to connect the DR16 to earth ground in the event of ground loops.

16) Power inlet

Connect the supplied power cable to this connection. Connect the other end of the power cable to an appropriate AC receptacle.

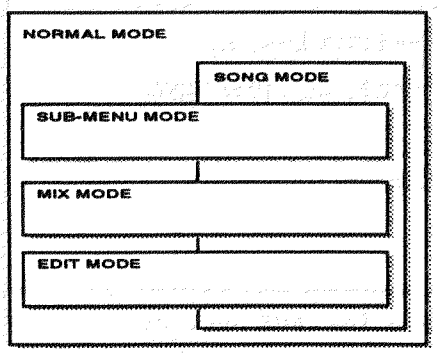


2 Getting Around the DR16

The DR16 is relatively easy to operate. If you have used a conventional tape recorder, you will find it quite straightforward.

Operating Modes

The DR16 has various operating modes:

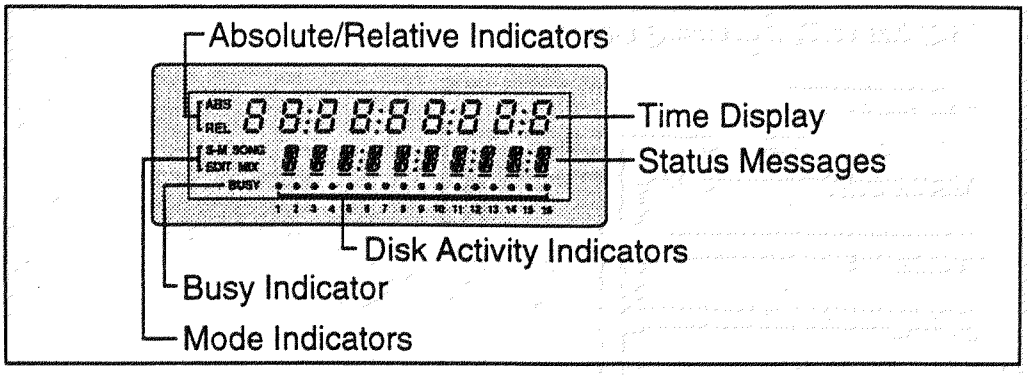


- Normal Mode
  Used for normal recording and playback similar to a conventional tape recorder.
- Sub-Menu Mode
  Used for various settings.
- Mix Mode
  Used to mix the track and channel levels.
- Edit Mode
  Used for various editing operations such as copy and move.
- Song Mode
  Used for setting MIDI Sync and BBC indication.

Operation

Display

The custom FLD (Fluorescent Light Display) shows recording time information and messages indicating the system status.



The top row displays either absolute or relative time. The "**ABS**" and "**REL**" indicators quickly show which display time is active. In Song Mode, the display shows bars, beats and clocks.

Absolute/Relative time

BBC - Song Mode time

The bottom row displays status, sub-menu, and error messages.

There are indicators for each of the following modes, "**S-M**" (Sub-Menu), "**MIX**" (Mix), "**EDIT**" (Edit), and "**SONG**" (Song). Normal mode does not have an indicator.

There is also a "**BUSY**" indicator, which shows disk activity, and 16 track data indicators, which report track status information as follows:

- Light On: playback audio is being monitored from disk.
- Light Off: no audio on disk.
- Light Flashing: audio recorded on disk, but playback track temporarily dropped.

Sub Menus

Many of the DR16 keys provide two functions. A main function and a *sub-menu* function. In most cases, the main function of such a key is printed above it, and the sub-menu function is printed below it in an amber typeface. Some sub-menu keys provide access to functions, some to variable parameters.

To access a sub-menu function, first press the SUB-MENU key, then while indicator in the key is flashing, press the respective key.

Cursor

The DR16 provides a cursor to step through the items in some of the sub-menu functions. Rotate the outer SHUTTLE of the JOG/SHUTTLE control clockwise to move to the right sub-menu parameter. Rotate the SHUTTLE counterclockwise to move to the left sub-menu parameter.

Setting Parameters

Most parameters can be set using the JOG/SHUTTLE control or the numeric keypad. However, this varies from function to function. Please refer to the operating procedure for each function.

Escape

If, while setting a parameter or using a function, you want to cancel it, press the ESCAPE key to return to the previous state.

Entering Time Values

To locate to any point, set the "in" point, "out" point, direct locate point, stack locate point, etc., you must display the desired time on the display. The desired time can be entered as follows:

1) Press the LOCATE key.

You will see a display similar to the following:

2) Use the numeric keypad to enter the desired time.

Time values should be entered from left to right. For example, to enter the time 15 minutes 32 seconds 20 frames, press these number keys in the following order: 1, 5, 3, 2, 2, 0. - -:1 5:3 2:2 0 will appear on the display.

> **Note:** *If you enter a time value that is greater than the possible range, the correct position will be calculated. For example, if you enter 78 seconds, the DR16 will locate to 1:18.*

If you enter an incorrect time, press the RESET key, then re-enter the time.

Press the ESCAPE key to cancel the locate function.

3) Press the LOCATE key.

The DR16 will display the specified time.

> **Note:** *The DR16 will actually locate to the specified time. If you want to return to the previous point, press the LAST 0/– key.*

Refer to the "Locate Functions" on page 81 for further details.

Of course, you can also use the Play ▷, Stop □, Fast Forward ▷▷, and Rewind ◁◁ keys, or the JOG/SHUTTLE control to enter a time on the display.

Specifying the "in" Point and "out" Point

The "in" point and "out" point values are used for auto punch-in/out recording and editing.

To set the "in" or "out" point:

1) Display the desired time on the display.

Select a location for the "in" or "out" point by using the Fast Forward ▷▷ or Rewind ◁◁ key followed by the Stop □ key, or by rotating the JOG/SHUTTLE control.

> **Note:** *In order to locate with the JOG/SHUTTLE control, the JOG ON key must be pressed on. See "JOG ON key" on page 10.*

2) Press the STORE/ENT key.

The message MEMORY will appear on the status line of the display and the time display will flash.

3) **Press the IN key or OUT key as required.**
The point will be stored. The time display will stop flashing. "IN" or "OUT" respectively will momentarily flash on the display.

4) **Confirm the stored locations.**
Press the IN key to set the DR16 to the "in" point; press the OUT key to select the "out" point.

> **Note:** *Certain operations, such as recording or Edit Mode erase, automatically update the "in" or "out" points.*

Using the <<MEMO>> function

The DR16 can store and recall up to nine sets of "in" and "out" points.

Storing a set of "in" and "out" points:

1) **Set the "in" and "out" points**
See "Specifying the "in" Point and "out" Point" on page 28.

2) **Press the SUB-MENU key.**
The indicator in the key will flash and the text SUB-MENU will appear on the display.

3) **Press the IN->OUT(<<MEMO>>) key.**
The message ! ! MEMO ! ! will appear on the display.

4) **Press the STORE/ENT key.**
The message !MEMO SET! will appear on the display.

5) **Press a numeric key (1 ~ 9) to store the set of "in" and "out" points.**
The message !MEMO SET! will flash on the display then disappear, and the set of points is stored.

Recalling a set of "in" and "out" points:

6) **Press the SUB-MENU key.**
The indicator in the key will flash and the text SUB-MENU will appear on the display.

7) **Press the IN->OUT(<<MEMO>>) key.**
The message ! ! MEMO ! ! will appear on the display.

8) **Press a numeric key (1 ~ 9) to recall the set of "in" and "out" points.**
The message ! ! MEMO ! ! will flash on the display then disappear, and the set of points is loaded.

3 Setting Up the DR16

Locating the DR16

The DR16 should be located on a strong, level surface, with plenty of room for ventilation. If you rack mount the DR16, leave at least 1U of free space above and below it.

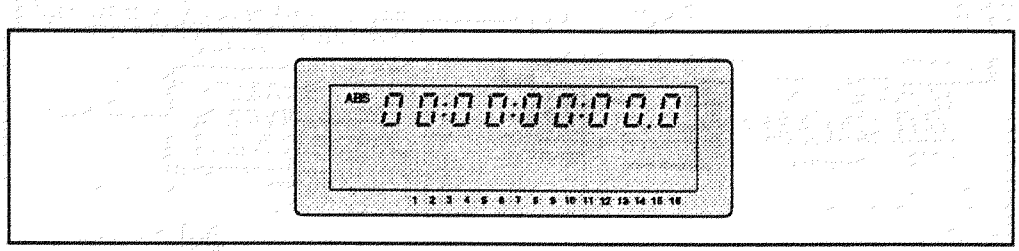
Connecting The Power

Warning: *Before connecting to an AC receptacle, make sure that the mains voltage in your area matches that printed on the DR16 rear panel.*

Connect the supplied power cable to the power inlet on the rear panel of the DR16. Connect the other end of the power cable to an appropriate AC receptacle.

Power On/Off

To power on the DR16, push the POWER switch to its ON position. The DR16 takes approximately 10 seconds to warm up before it can be used. During this time it checks the status of any disk drives, and its version number is shown on the display. Once the DR16 is ready for use, the following will appear on the display:



Before powering off the DR16, make sure that no functions are currently in progress. If the disk is being accessed, the "**BUSY**" indicator will be lit.

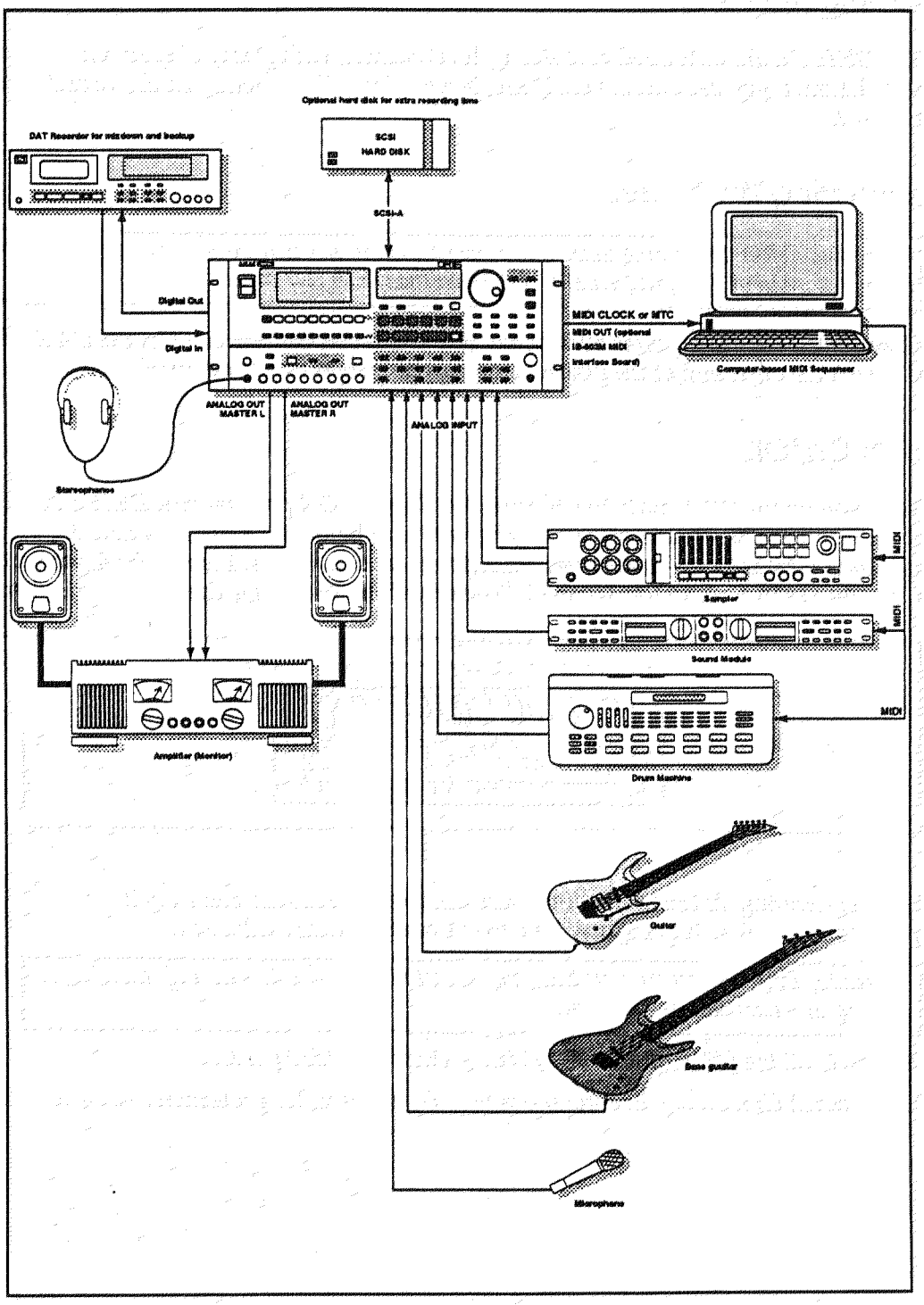
Warning: *Powering off the unit while the "**BUSY**" indicator is lit - during recording or backing up - may destroy some data.*

To power off the DR16, push the POWER switch to its OFF position.

The internal disk drive will automatically park its heads, for protection in transit.

Typical DR16 Setup

The following diagram shows the DR16 in a typical recording setup:



4 Recording

This chapter describes how to record using the DR16.

Sampling Frequency

It is important that you set the sampling frequency before recording. If it is changed after some material has been recorded, that material will playback at the wrong pitch.

The DR16 can record at any one of the three common digital audio sampling frequencies: 32 kHz, 44.1 kHz, and 48 kHz. It can also record at 44.056 kHz for NTSC video synchronization.

The deciding factors in your choice of sampling frequency are: application, required audio bandwidth, and available hard disk space. Some information about sampling frequency, applications, and audio bandwidth are provided below. Also see "Hard Disks" on page 109.

If you intend to mixdown or backup to DAT, refer to the operating manual that came with your DAT to see which sampling frequencies it can record at via its digital inputs.

48 kHz

This frequency is supported by most professional digital audio equipment and provides an audio bandwidth of about 22 kHz. Consumer type DAT and DCC recorders typically record at this frequency when their analog inputs are used. Use this frequency if you want the highest audio bandwidth.

44.1 kHz

This frequency is supported by most professional digital audio equipment and provides an audio bandwidth of about 20 kHz. CDs and prerecorded DCC tapes and MiniDiscs (MD) use this frequency. Professional recording studios that utilize digital equipment also typically use it. If your DR16 material is destined for distribution on CD, then it's best to use this frequency.

32 kHz

This frequency is widely used for digital broadcast applications where a 15 kHz audio bandwidth, about that of FM radio, is deemed acceptable. It is also used for some DSB (Digital Satellite Broadcasting) applications. It offers the lowest audio bandwidth, but the maximum recording time. It maybe useful for projects where recording time takes precedence over audio bandwidth.

44.056 kHZ

This frequency is used when the DR16 is synchronized to 59.94 Hz NTSC color video. Video post-production facilities and broadcasters working with the NTSC standard would be typical users of this frequency.

Selecting the Sampling Frequency

1) Press the SUB-MENU key.
The indicator in the key will flash and the text SUB-MENU will appear on the display.

2) Press the 2(DIGI) key - numeric keypad.
The message DIGI OUT will appear on the display.

3) Use the JOG/SHUTTLE control to select the sampling rate option.
The SHUTTLE control steps through the options one at a time. The message SMPL RATE will appear on the display.

4) Press the STORE/ENT key to select this option.

5) Use the JOG/SHUTTLE control to select a sampling frequency.
The following sampling frequencies are available:

Sampling Frequency	Display
48.0 kHz	FS 48KHZ
44.1 kHz	FS 44.1KHZ
32.0 kHz	FS 32KHZ
44.056 kHz	FS 44.056K

6) Press the STORE/ENT key.
The new sampling frequency will be selected.

> **Warning:** *You cannot use a mixture of sampling frequencies for a single project. If you attempt to combine different sampling frequencies, material recorded at one rate will playback at the wrong pitch at another rate.*

Input Source

The DR16 can record from its eight analog inputs, the stereo (two-channel) digital input, or the internal two-channel bus signal. It can record from a mixture of the analog inputs and the digital inputs simultaneously although you are limited to a total of eight tracks.

Analog Inputs

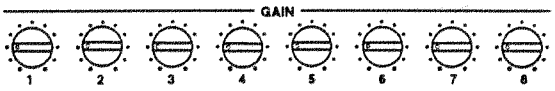
The DR16 has eight analog input connectors on its rear panel. These connectors use 1/4 inch stereo phone jacks. They accept balanced and unbalanced signals: Tip = hot, ring = cold, sleeve = ground.

Setting the INPUT Gain Switches

Each pair of the analog inputs (channels 1/2, 3/4, 5/6, and 7/8) has a HIGH/MID/LOW GAIN switch. Set the gain switches to match the level of the incoming signal. For a low signal level input such as a microphone, set the switch to the HIGH position. Set the switch to the MID position for consumer audio equipment (-10 dBu) and the LOW position for professional equipment (+4 dBu).

Setting the GAIN Controls

The front panel GAIN controls allow you to adjust the gain (level) of each analog input channel in the range of -10 dB to +22 dB. When the controls are at the 9 o'clock position, the gain is 0 dB.



Turn the GAIN controls clockwise to set the channel levels. Adjust the level to get the hottest possible signal without causing the 0 dB segment of the peak-hold LED bargraph to light.

Note: *The peak-hold meters are after the A/D converters in the signal path. When the amber 0 dB (Peak) segment lights, it indicates the level is too high and digital distortion or clipping has resulted. You should adjust the GAIN levels so this does not occur.*

The meters should be set to "PRE" (pre-mixer monitoring) in the SUB-MENU "MIXER" functions. See "Selecting Pre- or Post- Metering" on page 69.

When recording vocals or acoustic instruments, it is usually a good idea to have a compressor inserted in the signal path to avoid the distortion that can result due to sudden increases in level.

Digital Inputs

The DR16 has two digital input connectors on its rear panel: an XLR connector and an RCA/phono connector used to input AES/EBU and S/PDIF format digital signals.

When you record from a digital source, such as CD, DAT, DCC, or MD, you cannot adjust the signal level with the front panel GAIN controls. Most digital audio equipment offer no control over their digital signal output. This should not present any problem — usable digital audio will have a reasonable signal level.

There is some professional digital audio equipment, for example Akai's DD1500, that offers some degree of digital level control.

Sampling Frequency

To record via the digital inputs, the DR16 must be set to the same sampling frequency as that used by the incoming digital signal. This is because the DR16 has to synchronize with the incoming signal (word sync). If you are recording from a CD, prerecorded DCC, or MD, this will be 44.1kHz. If you are recording from a DAT that was recorded via analog inputs, this will be 48kHz.

If you attempt to connect a digital input from a source with a sampling frequency different than the current setting of the DR16, the message BAD INPUT will be displayed when you press a TRACK REC key. See "Selecting the Sampling Frequency" on page 34.

Digital Audio Formats

There are two industry-standard digital audio formats. Type 1 is usually referred to as AES/EBU format. Type 2 is also known as S/PDIF format. Both of the connectors (XLR and RCA/phono) on the rear panel of the DR16 can receive either Type 1 or Type 2 signals as input.

You simply select the connector you are going to use.

To switch to digital inputs:

1) **Press the DIGI key.**

The LED over the DIGI key lights. Input channels 1 and 2 are switched to digital. No analog signals at channels 1 and 2 will be input.

If no digital signal is input at the currently active connector, the LED flashes and the message PLL UNLOCK will flash on the display.

To select the active digital connector:

1) **Press the SUB-MENU key.**

The indicator in the key will flash and the text SUB-MENU will appear on the display.

2) **Press the DIGI(D IN) key.**

The display will show the currently active connector.

3) Use the JOG/SHUTTLE control to select the digital connector.

Connector	Display
XLR	DIGI.In XLR
RCA/phono	DIGI.In RCA

4) Press the STORE/ENT key.

The new connector will be selected.

Selecting the Input Channels

The input channels are initially assigned when the DR16 is powered on. The default assigns channels 1 to 8 as input hard disk tracks 1 to 8 and as input hard disk tracks 9 to 16. For example, input 1 is assigned to track 1, input 2 to track 2, etc.; input 1 is also assigned by default to track 9, input 2 to track 10, etc.

You can reassign the tracks to any input channel or to the internal bus channels.

To assign the input channels:

1) Press the SUB-MENU key.

The indicator in the key will flash and the text SUB-MENU will appear on the display.

2) Press one of the TRACK REC(INPUT SELECT) keys.

The selected TRACK REC key will light up and the display will show the currently selected input source for that track. For example, if you press the first TRACK REC key, the display will show RECIN A-1.

> **Note:** *You can select only one TRACK REC key at a time in this mode.*

3) Use the JOG/SHUTTLE control to select another input source.

Select an input source from the following list:

Display	Description
RECIN A-1	Analog inputs 1 ~ 8.
↓	
RECIN A-8	
RECIN D-1	When the DIGI key is ON, channels 1 and 2 are digital.
RECIN D-2	
RECIN BUSL	Left channel of the bus signal.
RECIN BUSR	Right channel of the bus signal.

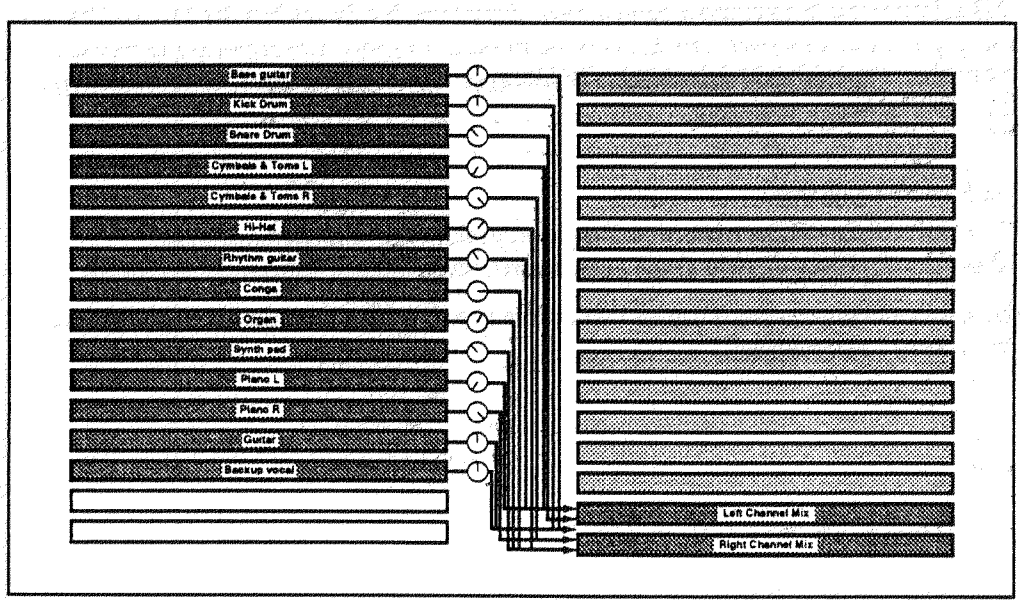
4) Press another TRACK REC(INPUT SELECT) key.

To change the rest of the channel assignments, repeat the above steps.

Using the BUS function

In addition to the rear panel connectors, you can also select as inputs the BUSL and BUSR signals. Using these inputs, it is possible to bounce-down fourteen tracks of material onto two stereo tracks. The bounce-down is entirely in the digital domain, allowing you to maintain almost perfect signal quality.

For example, assume you have recorded your rhythm section and other parts on tracks 1 to 14 and you now want to make a stereo mix onto tracks 15 (left channel) and 16 (right channel) as in the following diagram:



Set the destination tracks:

1) **Press the SUB-MENU key.**
The indicator in the key will flash and the text SUB-MENU will appear on the display.

2) **Press the TRACK REC(INPUT SELECT) key for track 15.**
The selected TRACK REC key will light up and the display will show the currently selected input source for that track.

3) **Use the JOG/SHUTTLE control to select the left bus signal.**
The display will show REC IN BUS1.

4) **Repeat for track 16.**
The display will show REC IN BUSR.

Set the source tracks:

1) **Using the Mix Mode functions, set the bus send ON for tracks 1 to 14.**
See "Selecting the Bus Send" on page 66. While you are in Mix Mode, you would also set the level, stereo pan position, and send levels for the source tracks. Also see "Individual Channel Settings" on page 64.

2) **Locate to the beginning of your rhythm tracks and record the bounce-down using the procedures listed in the following sections.**
This allows you to execute a completely digital track mix within the DR16. The tracks you bounce-down can then be recorded over (and subsequently mixed down to another stereo pair) to dramatically increase the effective number of tracks you have available.

Bus Function Notes

Although the bounce-down recording you make can be undone, if you subsequently erase or record over the source tracks, these cannot be retrieved.

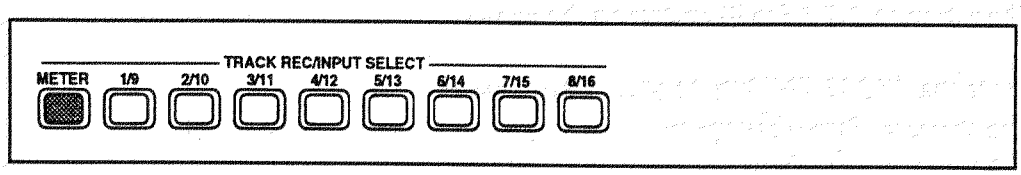
You cannot bounce-down tracks 1 to 16 to a stereo pair — the destination tracks are overwritten, not merged.

Starting & Stopping Recording

Arming Tracks

To arm tracks ready for recording:

1) **Press the respective TRACK REC keys.**
The TRACK REC keys of armed tracks will flash.



Recording

To start recording:

1) **Press the Play ▷ key and REC ● key simultaneously.**
The REC key and the TRACK REC keys of any armed tracks will light up, indicating that recording is in progress.

2) **Press the Stop ■ key to stop recording.**

> **Note:** *The DR16 stores the recording start point ("in" point) and stop point ("out" point). You can subsequently access these two points with the IN and OUT keys. These points are updated each time you make a recording.*

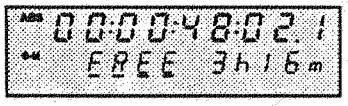
Available Recording Time Display

To check the available recording time:

1) **Press the SUB-MENU key.**
The indicator in the key will flash and the text SUB-MENU will appear on the display.

2) **Press the 1(DISK) key - numeric keypad.**
The message TIME will appear on the display.

3) **Press the STORE/ENT key to select this option.**
The amount of free disk space will be displayed in hours and minutes:



4) **Rotate the JOG/SHUTTLE control to view the total disk space.**
The total time capacity of the available disks will be displayed.

> **Note:** *The value shown will change depending on the selected sampling frequency. See "Selecting the Sampling Frequency" on page 34.*

Punch-In Functions

Manual Punch-In/Out

Manual punch-in/out allows you to punch-in and punch-out during playback.

1) **Set up the DR16 so that it is ready to record.**
Record setup procedures are explained on the preceding pages.

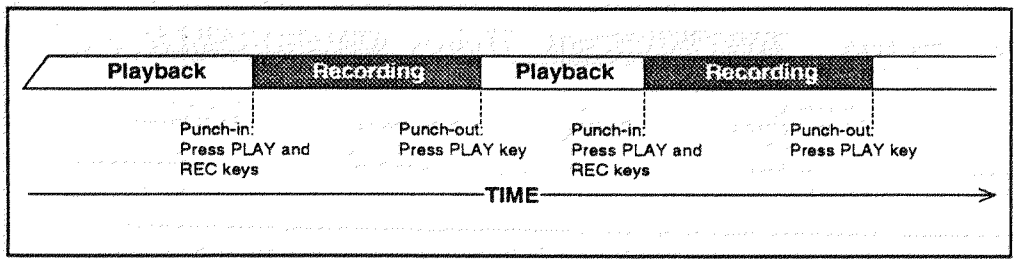
2) **Arm the channel that you want to use for punch-in/out.**
The TRACK REC key of the armed track will flash.

3) **Rewind to a position before the point at which you want to punch-in.**

4) **Press the Play ▷ key to start playback.**

5) **When the desired punch-in point is reached, press and hold down the Play key, then press the REC ● key.**
Punch in will occur as soon as the REC key is pressed.

6) **Press the Play key again to punch out.**
The following diagram shows the procedure for manual punch-in/out:



Manual Punch In/Out Notes

When you punch-in and punch-out, the "in" point and "out" point values are updated automatically. If you are trying a difficult punch-in/out, perform the manual punch-in/out with the rehearsal function on (see "Rehearsal" on page 48), then confirm the punch-in/out points using the auto punch-in/out function. When you are satisfied, switch off the rehearsal function and perform an auto punch (also see "Auto Punch-In/Out" on page 45).

You can repeat the punch-in and punch-out operations as often as you want. After a punch-out, you should leave an interval before you punch-in again.

When you punch-out, the monitor switches from source to playback, causing a momentary interruption in the monitor output. This does not affect the recording at all.

Footswitch Punch-In/Out

Manual punch-in/out can also be carried out using a footswitch, especially useful if you are playing an instrument and operating the DR16 simultaneously.

1) **Connect a footswitch to the FOOT SW connection on the front panel.**

2) **Set up the DR16 so that it is ready to record.**
Record setup procedures are explained on the preceding pages.

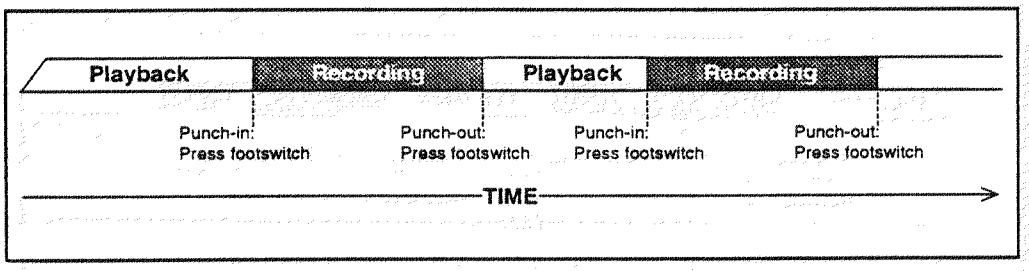
3) **Arm the channel that you want to use for punch-in/out.**
The TRACK REC key of the armed channel will flash.

4) **Rewind to a position before the point at which you want to punch in.**

5) **Press the Play ▷ key or press the footswitch to start playback.**

6) **When the desired punch-in point is reached, press the footswitch.**
Punch-in will occur as soon as you press the footswitch.

7) **Press the footswitch again to punch out.**
The following diagram shows the procedure for footswitch punch-in/out:



Auto Punch-In/Out

Auto punch in/out allows you to automatically punch in and punch out at the specified in and out points. This is useful when you need greater accuracy than that possible using manual punch in/out. It also allows you to repeat a punch in/out until you are satisfied with the result.

1) **Set up the DR16 so that it is ready to record.**
Record setup procedures are explained on the preceding pages.

2) **Arm the channel that you want to use for punch-in/out.**
The TRACK REC key of the selected track(s) will flash.

3) **Set the "in" and "out" points.**
See "Specifying the "in" Point and "out" Point" on page 28.

4) **Press the AUTO PUNCH key.**
The red LED beside the key will flash.

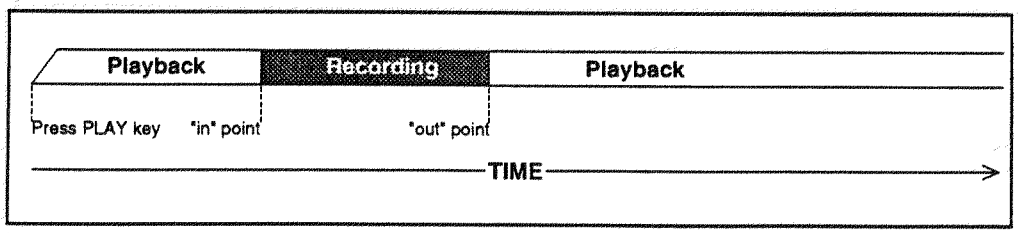
5) **Rewind to a position before the specified "in" point.**

6) **Press the Play ▷ key to start playback.**
The REC key will flash.

7) **When the specified "in" point is reached, punch-in will occur automatically.**
The REC key and the TRACK REC keys of any armed tracks will light up, indicating that recording is in progress.

8) **When the specified "out" point is reached, punch-out will occur automatically, and playback will continue.**
The REC key and the LED beside the AUTO PUNCH key will switch off. The TRACK REC keys of the armed tracks will start flashing again.

9) **Press the Stop □ key to stop playback.**
The following diagram shows the procedure for auto punch in/out:



Auto Punch-In/Out Notes

The auto punch-in/out function is switched off automatically after it has been used, and the red LED next to the AUTO PUNCH key goes out.

Make sure that you start playback from a position before the specified "in" point. Otherwise, auto punch-in/out cannot be performed.

Track Number Limitations

The DR16 carries certain technical limitations regarding the number of tracks you can use simultaneously for recording and playback. In practical terms, it is unlikely that you will encounter this limitation. Nevertheless, this limitation is described below.

When you select a track for recording (including auto or manual punch-in), if the number of tracks (including those that contain no data) exceeds a certain number, some tracks may not play back. In this case, the track indication on the counter will flash, indicating that the corresponding track will not play back.

This "certain number" of tracks is defined as when the number of recording tracks plus two times the number of playback tracks is equal to or greater than 32. In this case, one track will not play back for every two tracks that are recording.

If the number 32 is exceeded, the recording tracks will take priority and the playback tracks will not be heard.

As mentioned above, it is most likely to occur when you attempt to punch in numerous tracks simultaneously.

Tip: *You can select which tracks are going to be muted by turning off some unimportant playback tracks before you select the recording tracks, e.g. if 3 tracks are to be recorded, turn off 2 playback tracks prior to setting the recording tracks.*

Monitoring

During a recording session, you may want to change the signal that you are monitoring. Use the CHANNEL ON keys and TRACK REC keys for this purpose. The following table shows monitor operation under various conditions:

Key Selection		Recorder Status and Monitored Signal		
CHANNEL ON	TRACK REC	Stop	Playback	Recording
ON	OFF	Mute	Playback	Playback
OFF	ON	Input Signal	Input Signal	Input Signal
ON	ON	Input Signal	Playback	Input Signal

Note: *If the channel you are monitoring was set to BUSL or BUSR during Input Select (see "Selecting the Input Channels" on page 38), the source monitor signal of the channel (input signal) will not be output.*

Mute Stop Mode

The REC MON parameter is used to select a special Mute Stop mode that prevents the monitoring of inputs when recording is stopped. This is a special function intended for use in dialog replacement.

The following table describes monitoring operations when the Recording Monitor status is set to Mute Stop:

Key Selection		Recorder Status and Monitored Signal		
CHANNEL ON	TRACK REC	Stop	Playback	Recording
ON	OFF	Mute	Playback	Playback
OFF	ON	Mute	Input Signal	Input Signal
ON	ON	Mute	Playback	Input Signal

To switch to Mute Stop mode:

1) **Press the SUB-MENU key.**
The indicator in the key will flash and the text SUB-MENU will appear on the display.

2) **Press the 3(SET UP) key - numeric keypad.**
The message BRIGHTNESS will appear on the display.

3) **Use the JOG/SHUTTLE control to select recording monitor (REC MON) status.**
The message REC MON will appear on the display.

4) **Press the STORE/ENT key.**
The current recording monitor status will appear on the display.

5) **Use the JOG/SHUTTLE control to select MUTE STOP.**
The message MUTE STOP will appear on the display.

6) **Press the STORE/ENT key.**
The DR16 will enter Mute Stop mode.

To return to normal recording monitor status, repeat this procedure, but select NORMAL in step 5.

Rehearsal

The rehearsal function allows you to practice a recording before actually recording anything to disk. This is useful when used with automatic punch-in/out for checking punch-in/out points.

To turn the rehearsal function on:

1) **Press the REHEARSAL key.**
The red LED beside the key will flash.

With the rehearsal function on, you start recording as normal. When the specified in point is reached, the monitor signal is switched. However, nothing is actually recorded to disk. When the specified out point is reached, the monitor signal is switched again.

To actually record, switch off the rehearsal function, then start recording as normal.

Recording Undo

If you record new material over some existing material, and then decide that you preferred the original, you can use the undo function to restore the original. In fact, you can switch between the original and the new during playback for comparison. This is possible because the DR16 always records new material on a different area of the hard disk, except in Destructive Recording Mode. (See "Setting the Recording Mode" on page 50.)

Operation

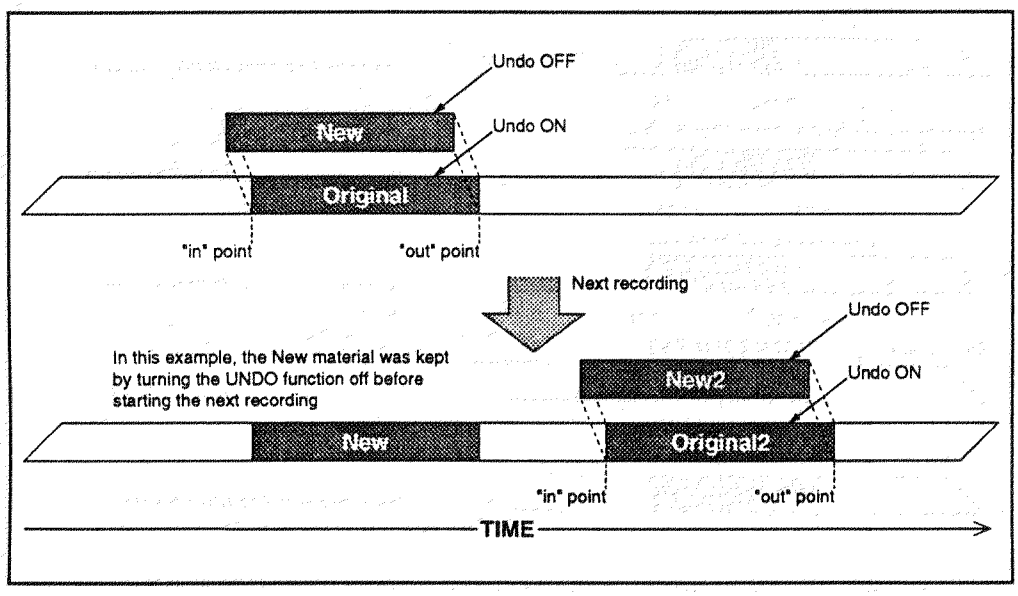
After each recording, the DR16 will play the new material.

1) **To undo a recording, press the UNDO key.**
The indicator in the key will light up. While this indicator is lit, the DR16 will play the material as it was before the recording.

2) **To switch back to the newly recorded material, press the UNDO key again.**
Before starting another recording, you must decide which material you want to keep: the original or the new. Once a new recording is performed, the undo function will apply to that new recording.

Once you have decided, leave the undo function set as required.

The following diagram shows how the recording undo function works:



Setting the Recording Mode

The Akai DR16 features two recording modes: Normal and Destructive.

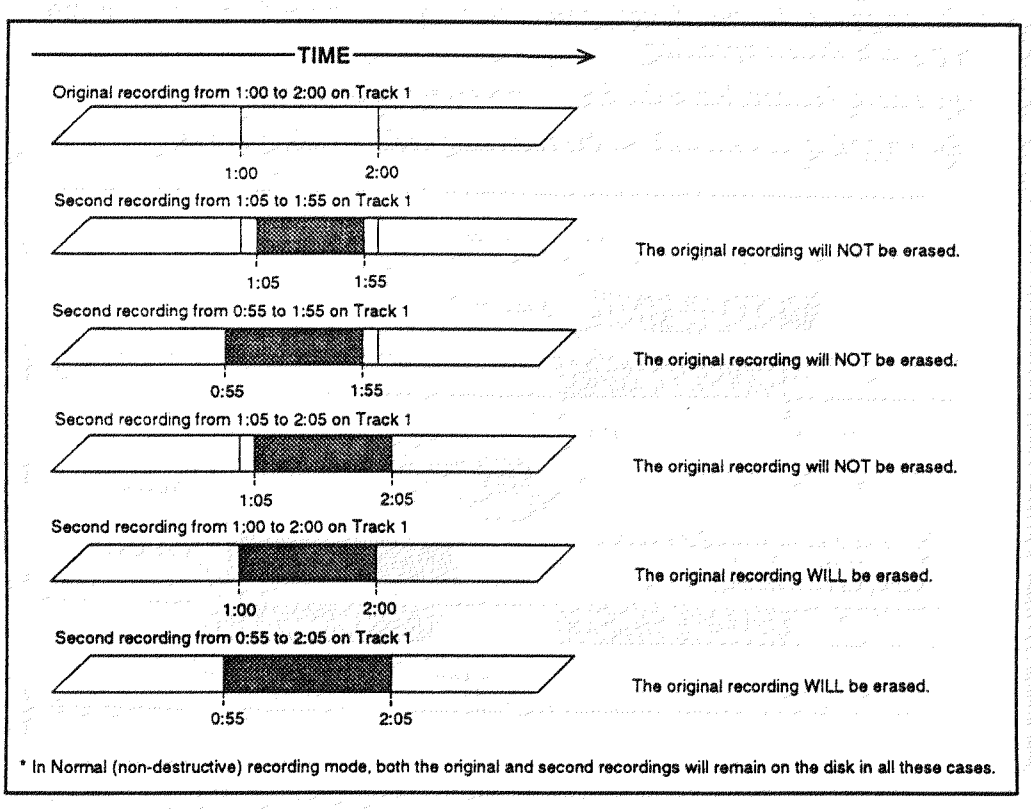
In Normal Recording mode, if you record twice on the same track at the same time location, both recordings remain on the hard disk, in different areas.

This is advantageous because you can later select between different takes. However, under these circumstances, it is possible to build up a lot of redundant audio, particularly if you are recording again and again over the same point.

In Destructive Recording mode, if you record twice on the same track at the same time location, the first recording is erased. This can help you save hard disk space and is useful if you are certain you no longer need the original recording.

Destructive recording mode is effective only when the second recording overwrites the recording you are replacing in its entirety. That is, you must record over the original take completely; if you drop in or out partway through the take, it will not be deleted.

Normal Recording mode is the default. If you power down the DR16 and then turn it back on, or if you load a new project, the DR16 will revert to Normal Recording mode.


TIME
Original recording from 1:00 to 2:00 on Track 1
1:00
2:00
Second recording from 1:05 to 1:55 on Track 1
1:05
1:55
The original recording will NOT be erased.
Second recording from 0:55 to 1:55 on Track 1
0:55
1:55
The original recording will NOT be erased.
Second recording from 1:05 to 2:05 on Track 1
1:05
2:05
The original recording will NOT be erased.
Second recording from 1:00 to 2:00 on Track 1
1:00
2:00
The original recording WILL be erased.
Second recording from 0:55 to 2:05 on Track 1
0:55
2:05
The original recording WILL be erased.
* In Normal (non-destructive) recording mode, both the original and second recordings will remain on the disk in all these cases.

To set the recording mode:

1) **Press the SUB-MENU key.**
The indicator in the key will flash and the text SUB-MENU will appear on the display.

2) Press the 3(SET UP) key - numeric keypad, then rotate the JOG/SHUTTLE control to select Recording Mode.

The message REC MODE will appear on the display.

3) Press the STORE/ENT key.

The current recording mode will appear on the display.

4) Use the JOG/SHUTTLE control to select a recording mode.

Recording Mode	Display
Normal	NORMAL
Destructive	DESTRUCT

5) Press the STORE/ENT key.

Warning: *Because of the destructive nature of Destructive Recording mode, please make sure that it is not inadvertently selected when you are recording or you risk losing valuable data. The UNDO function is not available when Destructive Recording mode is operative.*

Note: *In addition to destructive recording, the DR16 offers you other ways in which to maximize hard disk space.* *See "Optimizing Your Hard Disks" on page 117.*

5 Playback

This chapter describes some functions that apply to playback only.

Outputs

The DR16 has 16 analog outputs that can be configured as 16 individual track outputs in MULT mode, or the combination of two send outputs and a master stereo output in MIX mode. It also has a digital output that duplicates the signal at the master stereo output.

Analog Outputs

Individual Analog Outputs

The DR16 has 12 individual analog output connectors (1~12) on its rear panel. These connectors are output level-switched and use 1/4 inch stereo phone jacks. They can be used balanced or unbalanced: Tip = hot, ring = cold, sleeve = ground.

Master Stereo and Auxiliary Send Outputs

On the rear panel, there are four analog output connectors (13~16) that serve as tracks 13 through 16 analog outputs, or as two auxiliary send outputs and a master stereo output pair. These connectors are output level-switched and use 1/4 inch stereo phone jacks. They can be used balanced or unbalanced: Tip = hot, ring = cold, sleeve = ground.

Setting the Output Level

The level of the individual analog outputs is switched in pairs (1/2, 3/4, 5/6, 7/8, 9/10, and 11/12). The level of each pair of outputs, master (15~16) and auxiliary send (13~14), is also switched. When the switch is set to HIGH, the output level is equivalent to +4 dBu. When the switch is set to LOW, the output level is equivalent to -10 dBu.

	Level Switch	
	HIGH	LOW
Nominal output	+4 dBu	-10 dBu
Max. output	+18 dBu	+4 dBu

0 dBu = 0.775 Vrms

Set the level switches to match the nominal signal level of your mixing console or audio system.

Digital Outputs

The DR16 has two digital output connectors (DIGITAL I/O - MASTER OUT) on its rear panel: an XLR connector and an RCA/phono connector used to output AES/EBU and S/PDIF format digital signals.

Digital Audio Formats

The DR16 can transmit either of the two industry-standard digital audio formats. Type 1 (professional) is usually referred to as AES/EBU format. Type 2 (consumer) is also known as S/PDIF format. Both of the connectors (XLR and RCA/phono) on the rear panel of the DR16 can transmit either Type 1 or Type 2 signals as output.

Selecting the Digital Output Format

You select the digital output format with the following procedure:

1) **Press the SUB-MENU key.**
The indicator in the key will flash and the text SUB-MENU will appear on the display.

2) **Press the 2(DIGI) key - numeric keypad.**
The message DIGI OUT will appear on the display.

3) **Press the STORE/ENT key to select this option.**
The display will show the current output format.

4) **Use the JOG/SHUTTLE control to select an output format.**

Format	Display
AES/EBU — Type 1 (professional)	TYPE 1
S/PDIF — Type 2 (consumer)	TYPE 2

5) **Press the STORE/ENT key.**
The new output format will be stored.

Starting & Stopping Playback

To start playback:

1) **Press the Play ▷ key.**
The Play LED will light and the DR16 will start playback from its current position.

2) **Press the Stop □ key to stop playback.**
If you press the Play key again, playback will resume.

Starting & Stopping Playback by Footswitch

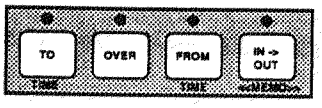
To start playback using a footswitch:

1) **Press the footswitch.**
The Play LED will light and the DR16 will start playback from its current position.

2) **Press the footswitch again to stop playback.**
If you press the footswitch again, playback will resume.

Special Play Keys

The DR16 has four special play keys for confirming edit points, punch-in locations, etc. These are the TO(TIME), OVER, FROM(TIME), and IN->OUT(<<MEMO>>) keys:

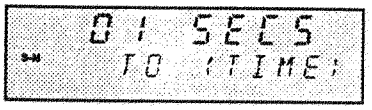


The TO key

Setting the TO time

1) Press the SUB-MENU key.
The indicator in the key will flash and the text SUB-MENU will appear on the display.

2) Press the TO(TIME) key.
The "play to" time will appear on the display:



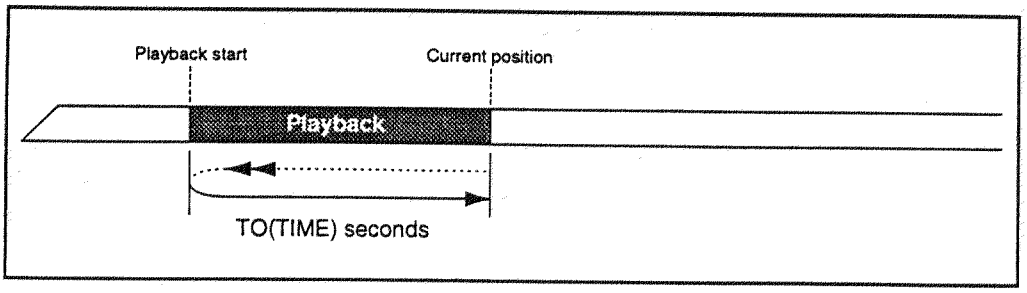
3) Use the JOG/SHUTTLE control, or numeric keypad to specify a time.
The "play to" time can be set from 0 to 59 seconds. The default is one (1) second.

4) Press the STORE/ENT key.
The specified time will be entered.

Operation

1) Press the TO key.
Playback will start the specified TO(TIME) number of seconds before the current position, continue up to that current position, and then stop.

The following diagram shows how the play TO function works:



The FROM key

Setting the FROM time

1) **Press the SUB-MENU key.**
The indicator in the key will flash and the text SUB-MENU will appear on the display.

2) **Press the FROM(TIME) key.**
The "play from" time will appear on the display:

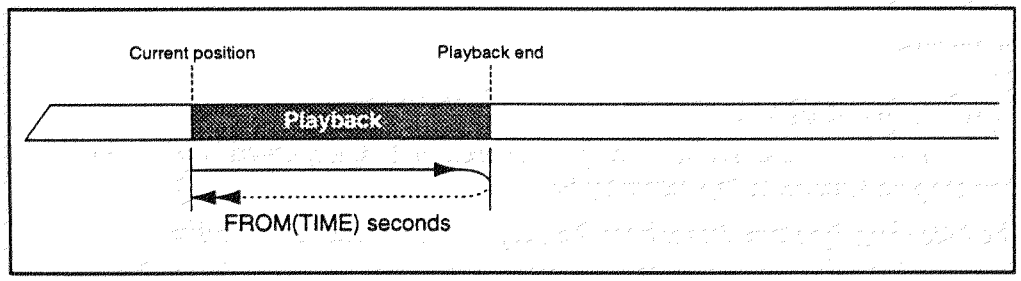
3) **Use the JOG/SHUTTLE control, or numeric keypad to specify a time.**
The "play from" time can be set from 0 to 59 seconds. The default is one (1) second.

4) **Press the STORE/ENT key.**
The specified time will be entered.

Operation

1) **Press the FROM key.**
Playback will start at the current position, continue for the specified FROM(TIME) number of seconds, and then stop and return to the current position.

The following diagram shows how the play FROM function works:



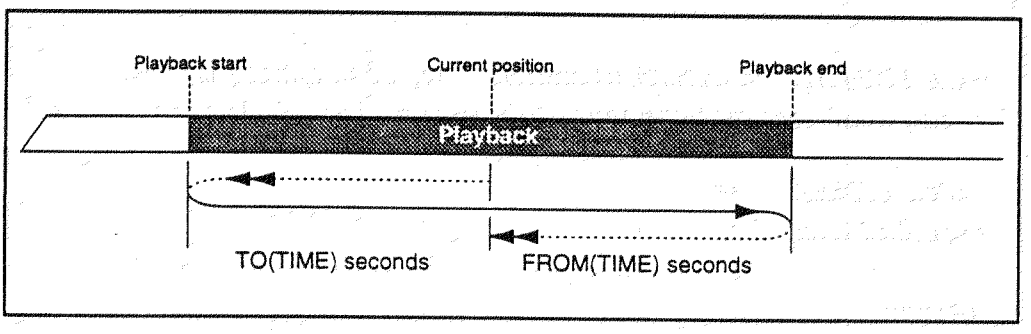
The OVER key

This function uses the TO and FROM times that were set in the two functions described previously. See "Setting the TO time" on page 56 and "Setting the FROM time" on page 57.

Operation

1) **Press the OVER key.**
Playback will start the specified TO(TIME) number of seconds before the current position, continue past current position for the specified FROM(TIME) number of seconds, and then stop and return to the current position.

The following diagram shows how the play OVER function works:



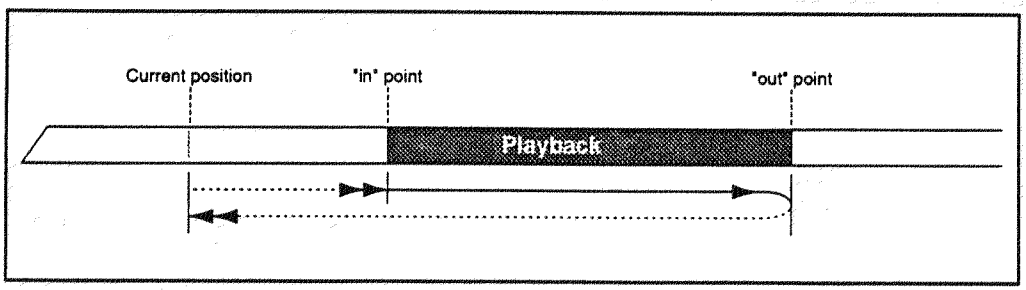
The IN->OUT key

1) **Set the "in" and "out" points.**
See "Specifying the "in" Point and "out" Point" on page 28.

Operation

1) **Press the IN->OUT key.**
Playback will start the marked "in" point, continue to the marked "out" point, and then stop and return to the current position.

The following diagram shows how the play IN->OUT function works:



Repeat

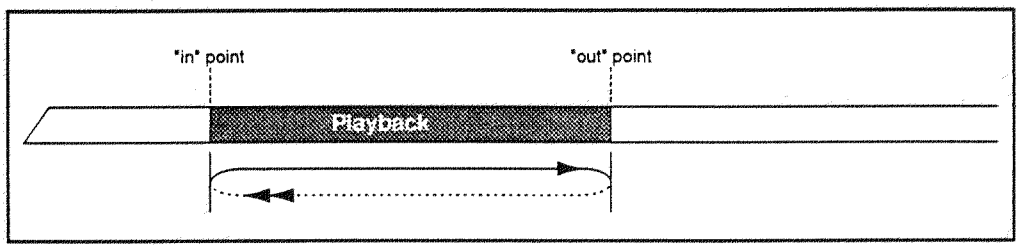
The repeat function allows you to repeatedly play the material that occurs between the "in" point and "out" point. Unlike the repeat function found on tape based recorders, the DR16 does not have to rewind when the "out" point is reached — repeat playback is continuous.

Operation

1) **Set the "in" and "out" points**
See "Specifying the "in" Point and "out" Point" on page 28.

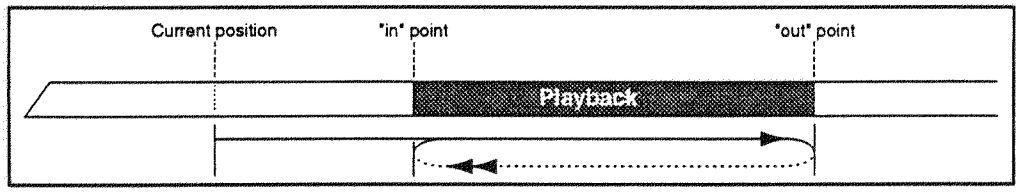
2) **Press the REPEAT key.**
Its indicator will light up.

3) **Press the Play ▷ key to start repeat playback.**
The following diagram shows how the REPEAT function works:

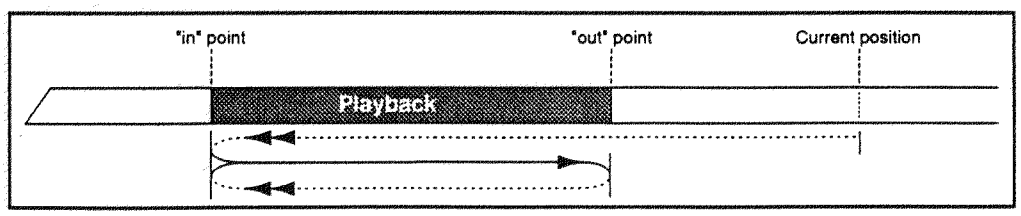


Repeat Playback Notes

If you start repeat playback at a position before the "in" point, or at a position between the "in" point and "out" point, playback will start from the current position, proceed up to the "out" point, then start repeating.



If you start repeat playback at a position after the "out" point, playback will start immediately from the "in" point.



Using Repeat to Punch-in

With repeat switched on, you can loop through a particular part, practicing a punch-in until you are confident. See "Manual Punch-In/Out" on page 43 and "Footswitch Punch-In/Out" on page 44.

Varispeed

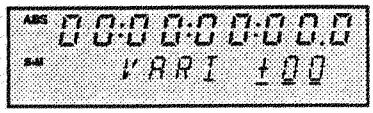
The varispeed function allows you to vary the pitch of recorded material during playback.

Setting the Amount of Varispeed

To set the amount of varispeed:

1) **Press the SUB-MENU key.**
The indicator in the key will flash and the text SUB-MENU will appear on the display.

2) **Press the VARI(SPEED) key.**
You will see a display similar to the following:



3) **Use the JOG/SHUTTLE control to specify the amount of varispeed.**
You adjust the varispeed in steps from -50 through +00 to +50. The approximate range is from -41.3% to +58.3%.

4) **Press the STORE/ENT key.**
The specified value will be set.

Operation

To use varispeed:

1) **Press the VARI key.**
The VARI indicator will light up.
Recorded material will now playback with the specified amount of varispeed.

2) **Press the VARI key again to turn off varispeed.**

Note: *When the varispeed is set fast, some of the playback tracks may be interrupted because of the slow data read from the harddisk.*

6 Mixer

This chapter examines the mixer functions.

Inside the DR16 is a 16-channel digital mixer. There are sixteen channels available from the hard disk tracks. You can set the mixer parameters for each channel independently.

Output Assignment Mode

There are two modes for the assignment of output: MULT output and MIX output.

In MULT output mode, 16 channels are output directly from the 16 analog outputs on the rear panel of the DR16. With this setting, the mixer parameter settings do not affect the signal from these outputs. The digital output and headphone output contain the stereo mix controlled by the mixer parameter settings. MULT output is the default setting.

In MIX output mode, the 16 channels are mixed and output from the MASTER L/R and SEND 1/2 connectors. With this setting, there is no output from the individual analog outputs 1 to 12. See "Signal Flow" on page 3 and "Block Diagram" on page 156.

The mixer also has a snapshot facility. This allows you to store mixer parameters and subsequently assign them to specific times, allowing you to perform automated mixing during playback.

Selecting MULT or MIX Output Assignment

You can select either MULT or MIX for the output assignment.

To select MULT or MIX output mode:

1) **Press the SUB-MENU key.**
The indicator in the key will flash and the text SUB-MENU will appear on the display.

2) **Press the MIX(MIXER) key.**
You will see a display similar to the following:

3) **Use the JOG wheel to select** SETUP.

4) **Use the SHUTTLE control to move the cursor to the right field, and rotate the JOG wheel to select** MULT **or** MIX **accordingly.**

5) **Press the SUB-MENU key to return to the previous display.**

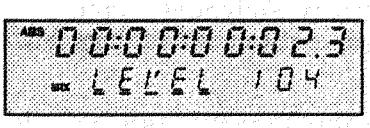
Individual Channel Settings

In order to access individual channel settings for mixing, you need to enter Mix Mode.

Selecting Mix Mode

You set the level, pan, and auxiliary send levels for each input channel using Mix Mode.

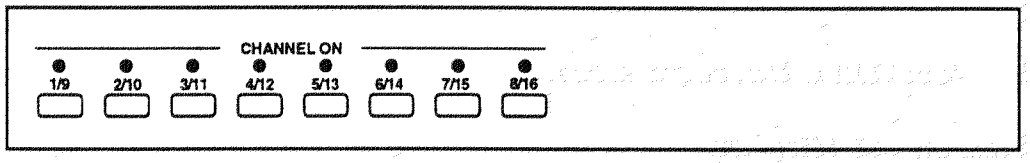
1) **Press the MIX key to access Mix Mode.**
The "LEVEL" function is the first function. You will see a display similar to the following:



Setting the Level for Each Channel

1) **Rotate the SHUTTLE control to move the cursor to the data item.**
The level data will be underlined: LEVEL 104. See "Cursor" on page 27.

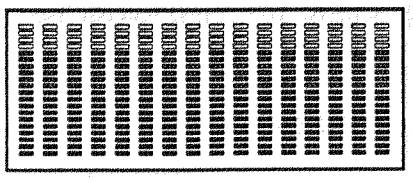
2) **Select the channel(s) you want to modify by pressing the CHANNEL ON keys.**
The LEDs over the selected keys light.



Note: *You may select more than one channel simultaneously. Press and hold the CHANNEL ON key for the first channel, then press the subsequent CHANNEL ON keys.*

Note: *The values between the channels are not relative. Selecting more than one channel and changing the value of any parameter will set all selected channels to the same value.*

3) **Rotate the JOG wheel to change the level value.**
As you change the value, not only does the display value change, it is also displayed graphically using the peak level meters:



The level range is from 000 to 127. The default level is 104.

Setting the Pan

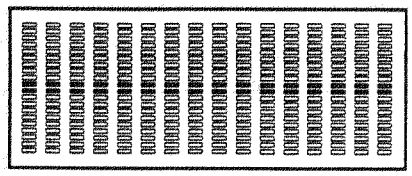
You set the stereo position of each input channel with this Mix Mode function.

1) **Rotate the JOG wheel to select the "PAN" function.**

2) **Rotate the SHUTTLE control to move the cursor to the data item.**
The pan data will be underlined: PAN MID.

3) **Select the channel(s) you want to modify.**

4) **Rotate the JOG wheel to change the pan position.**



The pan position range is from L63 (extreme left) through MID (center) to R63 (extreme right). The default pan position is MID.

Setting the Send Levels

The DR16 has two effect send channels, SEND1 and SEND2. When the Auxiliary Send is set to stereo (see "Selecting Mono or Stereo Send" on page 70), the send channels become SEND L and SEND R.

You set the stereo send level and stereo pan for each input channel with the following functions.

Setting the stereo send level:

1) **Rotate the JOG wheel to select the "SENDS" function.**
This function sets the stereo send level for each channel.

2) **Rotate the SHUTTLE control to move the cursor to the data item.**
The send level data will be underlined: SENDS 000.

3) **Select the channel(s) you want to modify.**

4) **Rotate the JOG wheel to change the level value.**
The send level range is from 000 to 127. The default send level is 000.

The send level will also be displayed graphically using the peak level meters.

Stereo send pan position:

1) **Rotate the JOG wheel to select the "SDPAN" function.**
This function sets the stereo send pan position for each channel.

2) **Rotate the SHUTTLE control to move the cursor to the data item.**
The send pan position data will be underlined: SDPAN MID.

3) **Select the channel(s) you want to modify.**

4) **Rotate the JOG wheel to change the level value.**
The send pan position range is from L63 (extreme left) through MID (center) to R63 (extreme right). The default pan position is MID.

The pan position will also be displayed graphically using the peak level meters.

When the Auxiliary Send is set to mono (see "Selecting Mono or Stereo Send" on page 70), you set the two send levels for each input channel with the following functions.

Mono send level:

1) **Rotate the JOG wheel to select the desired function.**
Select either the "SEND1" or the "SEND2" function.

2) **Rotate the SHUTTLE control to move the cursor to the data item.**
The send level data will be underlined: SEND1 000. This example shows the "SEND1" function.

3) **Select the channel(s) you want to modify.**

4) **Rotate the JOG wheel to change the level value.**
The send level range is from 000 to 127. The default send level for both send channels is 000.

The send level will also be displayed graphically using the peak level meters.

Selecting the Bus Send

The internal stereo bus is used when you are performing bounce-down recordings. Also see "Using the BUS function" on page 39. This Mix Mode function turns on the bus send for the selected input channel(s). The level and stereo pan position of the channel were set in previous steps.

1) **Rotate the JOG wheel to select the "BUS" function.**

2) **Rotate the SHUTTLE control to move the cursor to the data item.**
The bus send data will be underlined: BUS OFF.

3) **Select the channel(s) you want to modify.**

4) **Rotate the JOG wheel to toggle the bus send "ON" or "OFF".**
The default is OFF.

Setting the Fade

This function allows you to set the fade parameters so that the sound fades in and out. Storing these settings in the Snapshots (see "Snapshot Settings" on page 72) and creating a Snapshot map (see "Mapping Snapshots" on page 73) for automated mixing will create AutoFade data.

1) **Rotate the JOG wheel to select the "FADE" function.**

2) **Rotate the SHUTTLE control to move the cursor to the data item.**
The fade data will be underlined: FADE OFF.

3) **Select the channel(s) you want to modify.**

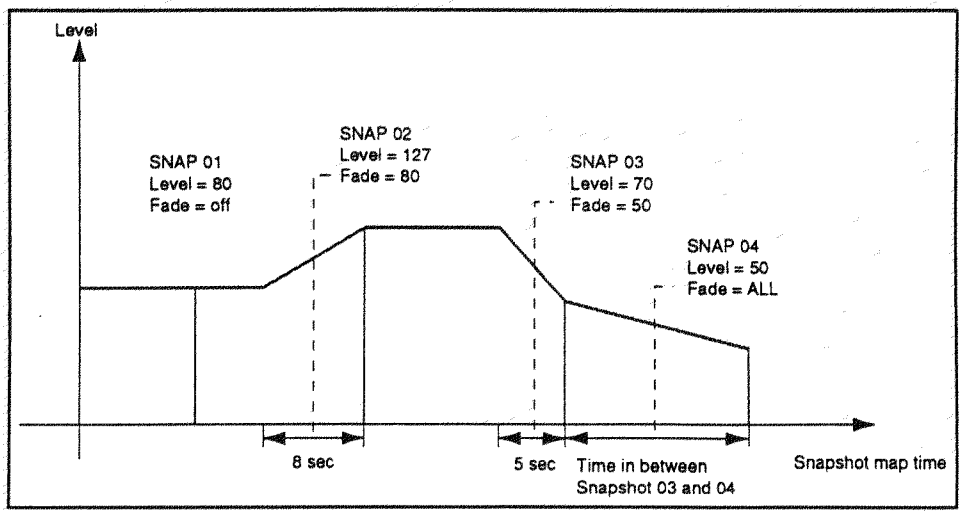
4) **Rotate the JOG wheel to set the fade time.**
The following options are available:

OFF: No fade will be applied.

001 - 126: The value here determines when the Snapshot starts fading in before the allocated time on the Snapshot map. You can set the fade from 0.1 seconds to 12.6 seconds in units of 100ms.

ALL: The Snapshot already starts fading in at the start time of the previous Snapshot. Therefore, fading will last for a period of time between the current Snapshot and the previous Snapshot.

Refer to the figure below:



Note: *You can change each channel level and the master level using the fade function.*

Setting an Auxiliary Input

You can designate any of the 16 mixer channels as an auxiliary input (AUX INPUT).

AUX INPUT channels perform no playback or record function. They are monitor inputs only and may be used to return the output from an external effects send into the DR16's mixer.

To designate a channel as an AUX INPUT:

1) **Press the SUB-MENU key.**
The indicator in the key will flash and the text SUB-MENU will appear on the display.

2) **Press one of the TRACK REC(INPUT SELECT) keys.**
The selected TRACK REC will light up and the display will show the currently-selected input source for the track. For example, if you selected the first TRACK REC key, the display will show RECIN A-1.

3) **Use the SHUTTLE control to move the cursor to the RECIN field.**
The RECIN field will be underlined.

4) **Rotate the JOG wheel.**
The display changes to AUXIN A-1.

The playback and record functions of the selected channel will be disabled.

The CHANNEL ON key can be used to mute the AUX INPUT. When the AUX INPUT is active, the CHANNEL ON key will flash.

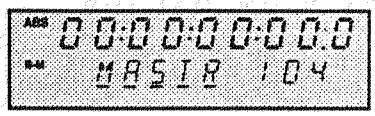
Note: *Separate input routing can be assigned for RECIN and AUXIN.*

System Settings

You set the master level and sends, and change the meter behavior with the following Sub-Menu "MIXER" Mode functions.

1) **Press the SUB-MENU key.**
The indicator in the key will flash and the text SUB-MENU will appear on the display.

2) **Press the MIX(MIXER) key.**
You will see a display similar to the following:



Adjusting the Master Level

This function changes the master output signal level.

1) **Rotate the JOG wheel to select the "MASTR" (Master Level) function.**

2) **Rotate the SHUTTLE control to move the cursor to the data item.**
The master level data will be underlined: MASTR 104.

3) **Rotate the JOG wheel to change the master level value.**
The master level range is from 000 to 127. The default master level is 104.

> **Note:** *The adjusted signal is sent to the ANALOG OUTPUT - MASTER L/R connectors, the front panel PHONES stereo jack, and the DIGITAL I/O - MASTER OUT connectors.*

Selecting Pre- or Post- Metering

The peak level meters can show the channel levels before (PRE) or after (POST) the Channel Level parameter (see "Setting the Level for Each Channel" on page 64). You should select POST to view the effects of the mix balance on the clipping conditions of each channel.

1) **Rotate the SHUTTLE control to move the cursor to the data item.**
The metering data will be underlined: METER PRE.

2) **Rotate the JOG wheel to toggle between "POST" and "PRE".**
The default is PRE.

Selecting Mono or Stereo Send

This function controls whether the two Auxiliary Sends are individual (MONO) or paired (STEREO). The status of this function effects the behavior of the other related functions.

1) **Rotate the JOG wheel to select the "SENDS" function.**

2) **Rotate the SHUTTLE control to move the cursor to the data item.**
The send data will be underlined: SENDS MONO.

3) **Rotate the JOG wheel to toggle the send between "MONO" and "STER" (stereo).**
The default is MONO.

Selecting Pre- or Post- Send

You can switch the signal path of the send channels to be before (PRE) or after (POST) the individual channel levels.

Mono pre- or post- send:

1) **Rotate the JOG wheel to select the desired function.**
Select either the "SEND1" or the "SEND2" function.

2) **Rotate the SHUTTLE control to move the cursor to the data item.**
The send path data will be underlined: SEND1 POST. This example shows the "SEND1" function.

3) **Rotate the JOG wheel to toggle the send between "PRE" and "POST".**
The default is POST.

Stereo pre- or post- send:

1) **Rotate the JOG wheel to select the "SENDS" function.**
This function switches the signal path of the stereo send channel to be before (PRE) or after (POST) the individual channel levels.

2) **Rotate the SHUTTLE control to move the cursor to the data item.**
The send path data will be underlined: SENDS POST.

3) **Rotate the JOG wheel to toggle the send between "PRE" and "POST".**
The default is POST.

Selecting Normal or Peak-Hold Metering

You can select peak hold behavior for the peak level meters.

1) **Rotate the JOG wheel to select the "METER" function.**

2) **Rotate the SHUTTLE control to move the cursor to the data item.**
The metering data will be underlined: METER NORM.

3) **Rotate the JOG wheel to toggle between "NORM" and "HOLD".**
The default is NORM.

The meters will hold the last peak indefinitely when you select HOLD. This can be useful in a situation where you are recording complex, highly dynamic sounds and you are unable to watch the meters. After you finished the recording, the peak levels will still be displayed on the meters. If the amber 0 dB (Peak) segment is lit, it indicates the level was probably too high and digital distortion resulted.

You clear the meters by pressing the ESCAPE key.

Snapshot Settings

Up to 99 mixer snapshots can be stored and recalled. These points are identified using a two-digit number (01 to 99).

Storing a Snapshot

To store a mixer snapshot:

1) **In Mix Mode, adjust the mixer parameters.**
For details, see the previous sections.

2) **Press the STORE/ENT key.**
The message MEMORY will appear on the display.

3) **Press the SNAPSHOT key.**
The message SNAP -- will appear on the display.

4) **Enter a two-digit number using the numeric keypad.**
The "SNAP" message will flash several times. For example, if you selected digits 4 and 2, the message SNAP 42 will flash on the display.

The snapshot will be stored and the DR16 will return to the previous display of Mix Mode.

> **Note:** *The settings of the front panel GAIN controls are not stored in the snapshot. These controls are part of the analog circuitry of the DR16. The mixer settings stored in the snapshot are all in the digital domain.*

Recalling a Snapshot

To recall a mixer snapshot:

1) **In Mix Mode, press the SNAPSHOT key.**
The message SNAP -- will appear on the display.

2) **Enter a two-digit number.**
The "SNAP" message will flash several times. For example, if you selected digits 42, the message SNAP 42 will flash on the display.

The snapshot will be recalled and all the mixer parameters set to its stored values. The DR16 will return to the previous display of Mix Mode.

Mapping Snapshots

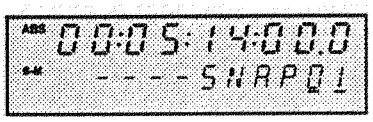
The allocation of stored snapshots to specific times is called Mapping. You create a map of snapshots and then play them back for automated mixing during playback.

Locating Snapshots

1) **Locate to the point to which you want to assign the snapshot.**

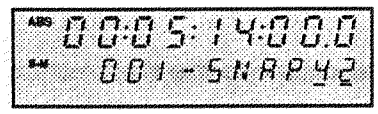
2) **Press the SUB-MENU key.**
The indicator in the key will flash and the text SUB-MENU will appear on the display.

3) **Press the SNAPSHOT(MAP) key.**
You will see a display similar to the following:



4) **Use the JOG/SHUTTLE control to select the snapshot you want to assign.**

5) **Press the STORE/ENT key.**
The display text flashes. The snapshot is assigned to a map step. You will see a display similar to the following:



6) **Locate to another point.**

7) **Use the JOG/SHUTTLE control to select the snapshot you want to assign and press the STORE/ENT key.**

8) **Repeat the above two steps.**
In this way you can create a map of snapshots.

Checking Snapshots

1) **Press the SUB-MENU key.**
The indicator in the key will flash and the text SUB-MENU will appear on the display.

2) **Press the SNAPSHOT(MAP) key.**

3) **Rotate the SHUTTLE control to move the cursor to the step number.**
The step number will be underlined: 001 - SNAP42. See "Cursor" on page 27.

4) **Rotate the JOG wheel to change the step number.**
The display will show the snapshot numbers and the point at which each step is located. You can step forward and backward through your map of snapshots.

Inserting Snapshots

1) **Check your snapshot map.**
Use the steps shown in "Checking Snapshots" on page 73.

2) **Locate to another point.**

3) **Use the JOG/SHUTTLE control to select the snapshot you want to assign and press the STORE/ENT key.**
The snapshot numbers are assigned by the location of the snapshot on the time axis. When you assign a new snapshot to a locate point earlier than an existing snapshot, the new snapshot is given the existing number. The subsequent snapshot numbers are updated.

Erasing Snapshot Locations

1) **Press the SUB-MENU key.**
The indicator in the key will flash and the text SUB-MENU will appear on the display.

2) **Press the SNAPSHOT(MAP) key.**

3) **Rotate the SHUTTLE control to move the cursor to the step number.**
The step number will be underlined: 001-SNAP42.

4) **Rotate the JOG wheel to select the desired step number.**

5) **Press the REC ⏺ key.**
The selected snapshot will be erased and the subsequent step numbers will be updated.

> **Note:** *Erasing a snapshot only removes the snapshot from the time axis. The snapshot data is still stored in memory and can be recalled. See "Recalling a Snapshot" on page 72.*

> **Note:** *You cannot delete the initial snapshot number 01.*

Automation Mix

The mixer automation may be used to control the signal from the digital and headphone outputs, even when the mixer is in MULT mode.

1) **Press the SNAPSHOT key.**
The green LED beside the key lights.

2) **Press the Play ▷ key to listen to the mix.**
As the DR16 plays through the recording, the different mixer snapshots are loaded, changing the levels and other functions dynamically.

> **Tip:** *If the intervals between snapshots become too small, the DR16 will display the message MIXER BUSY. In this event, please allow greater intervals between snapshots.*

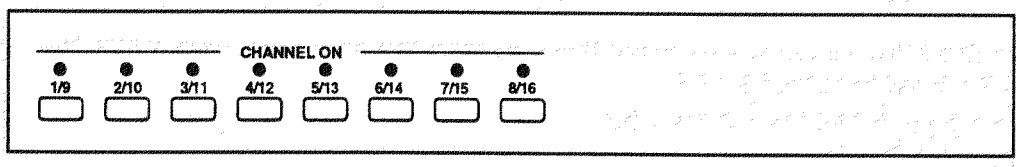
> **Warning:** *If the DR16 becomes too busy due to an excessive number of short takes and extremely complex editing, rather than stopping all operations, it will select certain tracks to be dropped from playback.*

Other Functions

Solo Function

The solo function allows you to listen to selected channels in isolation.

1) **Press the SOLO key.**
The green LED beside the key flashes. All the LEDs above the CHANNEL ON keys are switched off.



2) **Press the CHANNEL ON key for the channel(s) you want to monitor.**
You can select more than one channel by holding the first key while you press other keys.

3) **Press the SOLO key again to cancel the solo function.**

ADAT Digital Output

If you install an optional ADAT IB-804A interface board, you will be able to digitally transfer audio between the DR16 and an Alesis ADAT machine (or any other device that includes this interface).

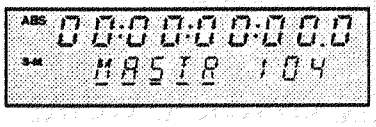
However, since the Alesis ADAT uses only 8 tracks, you will be able to transfer only eight audio signals from the DR16 at any time. In the DR16, the ADAT interface board is fixed to mixer channel outputs 1 through 8. This is fine if you want to transfer audio from DR16 mixer channels 1 through 8. If you wish to transfer audio from DR16 mixer channels 9 through 16, you must first use the ADAT swap function.

The ADAT swap function enables you to swap mixer channels 1-8 and 9-16. (That is, tracks 1-8 will be output on channels 9-16, and tracks 9-16 will be output on channels 1-8.)

To perform the ADAT swap function:

1) **Press the SUB-MENU key.**
The indicator in the key will flash and the text SUB-MENU will appear on the display.

2) **Press the MIX(MIXER) key.**
You will see a display similar to the following:



3) **Use the JOG wheel to select ADAT NORM.**

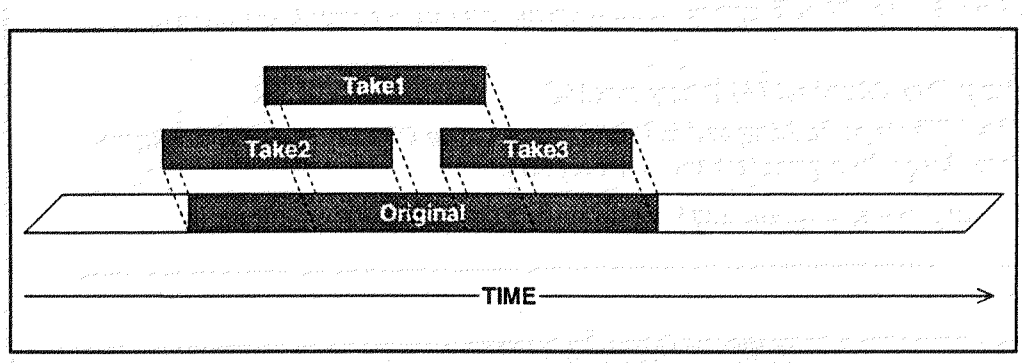
4) **Use the SHUTTLE control to move the cursor to the right field, and rotate the JOG wheel to select SWAP.**
Reset the right field to NORM when you wish to digitally transfer audio via channels 1-8.

7 Take Functions

The DR16 gives you the ability to record up to five takes of a recording, allowing you to compare different takes or replace the current recording with data that was stored as a take.

The Take functions are similar to the Undo function, only much more versatile. When you press the UNDO key, you can only compare two recordings — the old and the new (see "Recording Undo" on page 49). With the Take functions, you can compare five stored takes plus the new and old recordings.

The following diagram illustrates the take function:



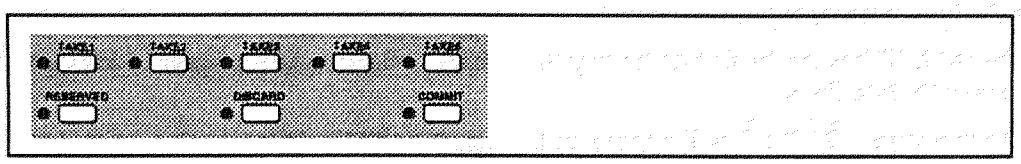
Storing a Take

1) Make a recording of some material.

See "Recording Undo" on page 49, and "Arming Tracks" and "Starting & Stopping Recording" on page 41.

2) Press the RESERVED key.

The red LED beside the RESERVED key flashes and the green LEDs beside the available TAKE1 to TAKE5 keys flash. The LEDs beside TAKE keys with data are turned off.



The message *RESERVED* will appear on the display.

3) Press the TAKE key you want to use to store the recording.

When the take is stored, the LED lights up beside the corresponding TAKE key.

Checking a Take

1) Press the TAKE key you want to listen to.

Select from the TAKE keys which have a lit LED. When a TAKE key has been selected, its LED flashes.

2) Press the Play ▷ key to listen to the take.

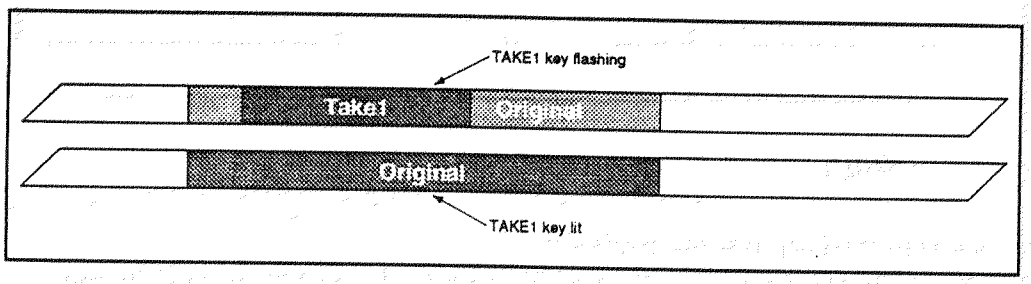
The DR16 will play from the current point, switching to the stored take data when it reaches that location.

> **Note:** *When a TAKE key LED is flashing, you cannot record or edit. The message* `TAKE PLAY` *will appear on the display. You can use any other function.*

3) Press the selected TAKE key again.

The LED stops flashing and is left turned on. The DR16 will play the original recording when you start another playback.

The following diagram illustrates the checking procedure:



Committing a Take

Once you have found the "perfect" take, you can replace the original data with the following procedure:

1) Press the COMMIT key.

The red LED beside the COMMIT key flashes and the green LEDs beside the TAKE keys with data flash.

The message `COMMIT` will appear on the display.

2) Press the TAKE key that contains the "perfect" take.

The LED beside the selected key continues to flash. (The LEDs beside the rejected keys turn off.) The LED beside the COMMIT key continues to flash.

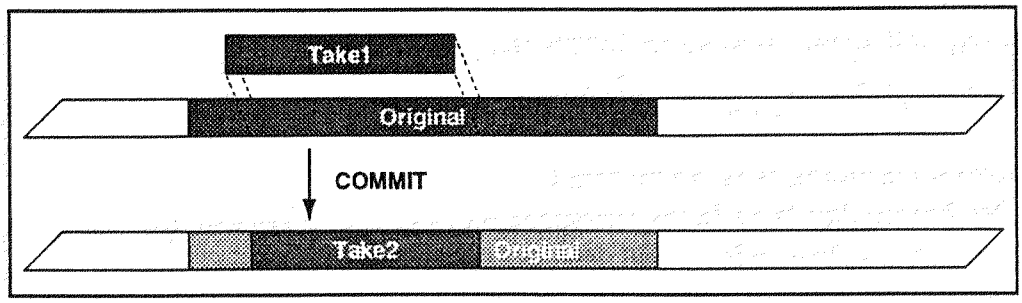
The message `SURE ??` will appear on the display.

3) Press the STORE/ENT key to confirm.

Your "perfect" take replaces the original data and the selected TAKE key is cleared.

> **Note:** *You can still restore the original material even after you have used the commit procedure by pressing the UNDO key.*

The following diagram illustrates the commit procedure:



Deleting a Take

1) Press the DISCARD key.

The red LED beside the DISCARD key flashes and the green LEDs beside the TAKE keys with data flash.

The message DISCARD will appear on the display.

2) Press the TAKE key that you want to delete.

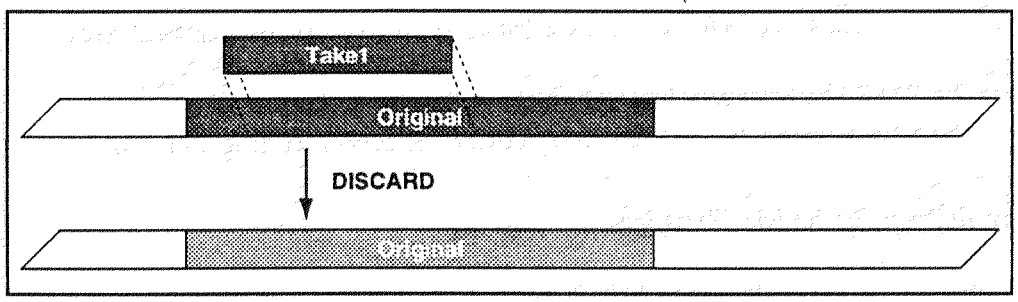
The LED beside the selected key continues to flash. (The LEDs beside the remaining keys turn off.) The LED beside the DISCARD key continues to flash.

The message SURE ?? will appear on the display.

3) Press the STORE/ENT key to confirm.

The selected TAKE key is cleared.

The following diagram illustrates the discard procedure:

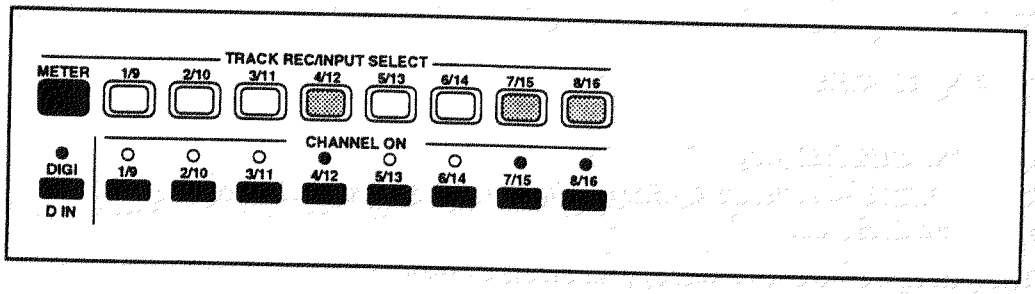


Other Take Applications

Storing Specific Tracks or Sections

You can store a track, a section of a track, or a set of tracks to a take.

1) **Make a recording of some material.**
After the recording is made, the corresponding TRACK REC key will light, to show which tracks contain data. You can choose which tracks to store.



2) **If you wish to specify a section of a track, assign IN and OUT points to specify the appropriate section.**
(See "Specifying the "in" Point and "out" Point" on page 28.)

3) **Press the RESERVED key.**
The red LED beside the RESERVED key flashes and the green LEDs beside the available TAKE keys flash. The LEDs beside TAKE keys with data are turned off. The LED over the CHANNEL ON keys for tracks that contain data will light.
The message *RESERVED* will appear on the display.

4) **Press the appropriate TRACK REC key (or keys) to turn off unwanted tracks.**

5) **Press the TAKE key you want to use to store the recording.**
When the take is stored, the LED lights up beside the corresponding TAKE key.

Committing Specific Tracks

You can commit a specific track or set of tracks from a take.

1) **Press the COMMIT key.**
The message *COMMIT* will appear on the display.

2) **Press the TAKE key that contains the part you want to commit to the track.**
The message *SURE ??* will appear on the display.

3) **Press the appropriate TRACK REC key(s) to turn off tracks you do not want to commit.**

4) **Press the STORE/ENT key to confirm.**

8 Locate Functions

This chapter explains how to use the locate functions. You can locate to the beginning of a recording. You can also locate to a specific point just by entering the time on the display, store and recall up to eight direct locate points using the number keypad, and store and recall up to 100 stack locate points. Unlike tape based recorders, the DR16 does not need to rewind or fast forward to locate specific points. DR16 locate functions are instantaneous.

Locating to the Beginning of a Recording

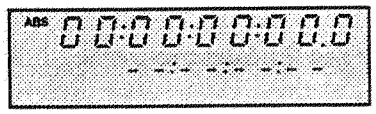
To locate to the beginning of a recording:

1) **Press the LOCATE key twice.**
The DR16 will immediately locate to the beginning of the recording.

Locating to a Specific Point

To locate to a specific point:

1) **Press the LOCATE key.**
You will see a display similar to the following:



2) **Use the numeric keypad to enter the desired time.**
Time values should be entered from left to right. For example, to enter the time 15 minutes 32 seconds 20 frames, press these numeric keys in the following order: 1, 5, 3, 2, 2, 0. - -:1 5:3 2:2 0 will appear on the display.

> **Note:** *If you enter a time value that is greater than the possible range, the correct position will be calculated. For example, if you enter 78 seconds, the DR16 will locate to 1:18.*

If you make a mistake while entering the time, press the RESET key, then re-enter the time.

Press the ESCAPE key to cancel the locate function.

3) **Press the LOCATE key.**
The DR16 will locate to the specified point.

> **Note:** *Pressing the STORE/ENT key also causes the DR16 to locate to the specified point.*

A quick and convenient method of entering a location value is to use the :/STACK key. This key pushes two digits of the locate time with one key press. For example, to enter the time 1 hour 5 seconds 6 frames:

Press the LOCATE key.

Press the 1 key, then press the :/STACK key. 01:-- --:-- --:-- - will appear on the display.

Press the :/STACK key again. 01:00:-- --:-- - will appear on the display.

Press the 5 key, then press the :/STACK key. 01:00:05:-- - will appear on the display.

Finally, press the 6 key, then press the :/STACK key. 01:00:05:06 will appear on the display and the DR16 will locate to that point.

Direct Locate Points (1 ~ 9 Keys)

Up to nine direct locate points can be stored and recalled using the 1 to 9 numeric keys. These are called direct locate points because you can locate to the stored point directly, just by pressing the respective numeric key.

Storing Direct Locate Points

To store a direct locate point:

1) **Locate to the desired point.**
The location will be shown on the display. See "Locating to the Beginning of a Recording" on page 81.

2) **Press the STORE/ENT key.**
The message MEMORY will appear on the display and the time display flashes.

3) **Press a numeric key to store the direct locate point.**
A "LOCATE" message will flash on the display. For example, if you selected the 2 numeric key, the message LOCATE 2 will flash on the display. The locate point is stored.

To store a direct locate point during playback or recording:

1) **Press the STORE/ENT key when the desired time is reached.**
The message MEMORY will appear and the time display will freeze at the current location and start flashing. Playback or recording will continue uninterrupted while you enter the point.

2) **Press a numeric key to store the direct locate point.**
A "LOCATE" message will flash on the display. For example, if you pressed the 4 numeric key, the message LOCATE 4 will flash on the display. The locate point is stored.

Recalling Direct Locate Points

To recall a direct locate point:

1) **Press the corresponding 1 to 9 numeric key.**
The DR16 will locate to the stored point.

If no time value has been stored, the DR16 will locate to the beginning of the disk.

Stack Locate Points

Up to 100 stack locate points can be stored and recalled. These points are identified using a two-digit number (00 to 99).

Storing Stack Locate Points

To store a stack locate point:

1) **Locate to the desired point.**
The location will be shown on the display. See "Locating to the Beginning of a Recording" on page 81.

2) **Press the STORE/ENT key.**
The message MEMORY will appear on the display and the time display flashes.

3) **Press the STACK key.**
The message STACK -- will appear on the display.

4) **Enter a two-digit number.**
The "STACK" message will flash several times. For example, if you selected the digits 4 and 2, the message STACK 42 will flash on the display.

The stack locate point will be stored and the previous mode restored.

To store a stack locate point during playback or recording:

1) **Press the STORE/ENT key when the desired time is reached.**
The message MEMORY will appear and the time display will freeze at the current location and start flashing. Playback or recording will continue uninterrupted while you enter the point.

2) **Press the STACK key.**
The message STACK -- will appear on the display.

3) **Enter a two-digit number.**
The "STACK" message will flash several times. For example, if you selected the digits 8 and 6, the message STACK 86 will flash on the display.

The stack locate point will be stored and the time display for playback or recording will continue from the current point.

Recalling Stack Locate Points

To recall a stack locate point:

1) **Press the STACK key.**
The message STACK -- will appear on the display.

2) **Enter the corresponding two-digit number.**
The DR16 will locate to the stored point.

If no time value has been stored, the DR16 will locate to the beginning of the disk.

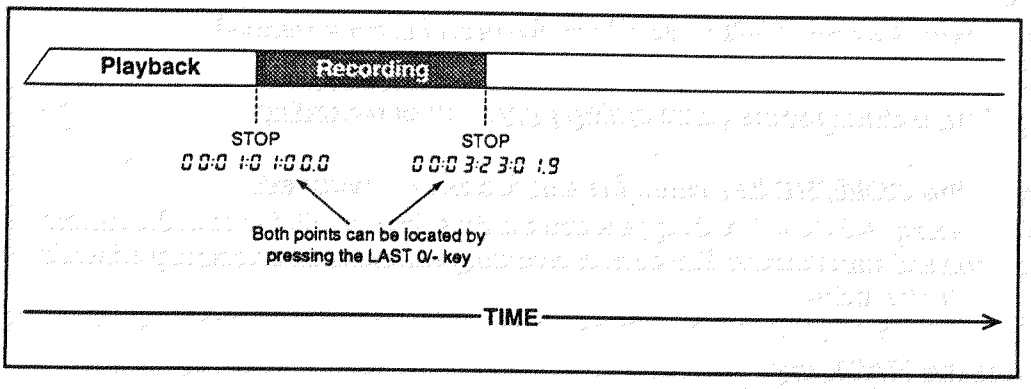
Last Memory

The LAST 0/- key function allows you locate to the last two points at which the stop key was pressed. This can be used to return to the previous point after locating to a different point, or after playing, recording, rewinding, and fast forwarding. It can also be used when checking direct and stack locate points. First, locate to the point that you want to check, then press the LAST 0/- key to return to the previous point.

In addition, this function can be used to check whether a recording was successful. When you stop recording, pressing the LAST 0/- key will return to the point at which recording started (presuming that the stop key was pressed before recording). Pressing the LAST 0/- key again will locate to the point at which recording was stopped.

The LAST 0/- key can be pressed repeatedly. The DR16 will simply toggle between the last two places where you pressed the stop key.

The following diagram shows how the last memory function can be used to locate to the start and end points of a recording:



Preroll

The preroll function allows you to locate to a point a few seconds before the specified locate point. For example, if the preroll value is set to 5, and the preroll function is on, the DR16 will locate to a position 5 seconds before the specified locate point.

Setting the Preroll Time

1) **Press the SUB-MENU key.**
The indicator in the key will flash and the text SUB-MENU will appear on the display.

2) **Press the PREROLL(TIME) key.**
You will see a display similar to the following:

3) **Use the JOG/SHUTTLE control, or numeric keypad to set the preroll time.**
Preroll time can be set from 0 to 59 seconds. The default preroll time is 2 seconds.

4) **Press the STORE/ENT key.**
The new preroll time will be entered.

Operation

1) **Press the PREROLL key.**
The LED beside the key will light up.

The next time you press a key on the numeric keypad to locate to a stored locate point ("Locating to a Specific Point" on page 81), the DR16 will locate to a position before the point as specified by the preroll time.

2) **Press the PREROLL key again.**
The LED beside the key will switch off and the DR16 will locate to the exact position you specify (when you press a key on the numeric keypad to locate to a stored locate point).

9 Time Display

The DR16 can display time in any one of three ways: absolute, relative, and BBC:

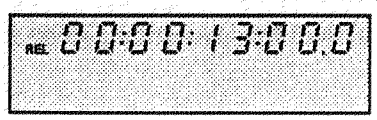
Absolute Time (ABS)

Absolute time effectively starts at the beginning of the hard disk at zero, and is fixed. When the DR16 is in this mode, the ABS indicator will be lit on the display. You will see something similar to the following:

Relative Time (REL)

Relative time, although referenced to absolute time, can be reset to zero at any point, or offset from absolute time by a specified amount. When using MIDI or SMPTE synchronization, relative time can be used to offset the DR16.

The REL indicator will be lit when this mode is active. You will see a display similar to the following:



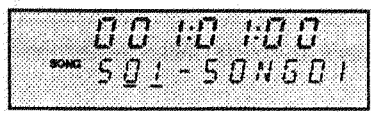
The following diagram shows the meaning of the indicators:

Bars, Beats, Clocks Display (BBC)

BBC display is intended for use with MIDI synchronization. See "Song Mode" on page 139. The display shows Bar, Beat, and Clock (1 beat = 24). The following diagram shows the meaning of the indicators:

The ABS/REL key is used to switch between absolute time and relative time, and the SONG key is used to switch between time display and BBC display.

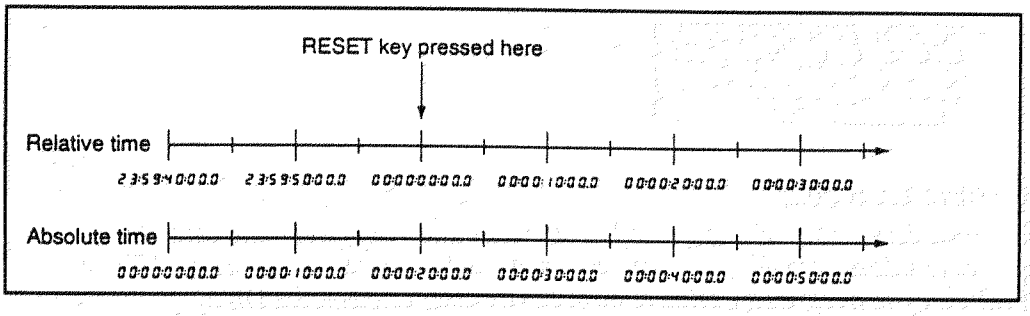
When this mode is active, the SONG indicator is lit on the display, similar to the following:



Setting Relative Time to Zero

1) **Locate the point at which you want to set relative time to zero.**

2) **Press the RESET key.**
Relative time will be selected automatically, and set to 00:00:00:00.0.
To return to absolute time, press the ABS/REL key.



Using the RESET key to set the relative time means that you cannot set the relative time at a point before absolute zero. This is because the relative zero can only be set at a point after the absolute zero. To set relative time to a point before absolute zero, use the offset function.

Setting a Relative Time Offset

The relative time can also be set by specifying an offset.

1) **Press the SUB-MENU key.**
The indicator in the key will flash and the text SUB-MENU will appear on the display.

2) **Press the ABS/REL(OFFSET) key.**
You will see a display similar to the following:

3) **Use the JOG/Shuttle control, or numeric keypad to specify the offset.**

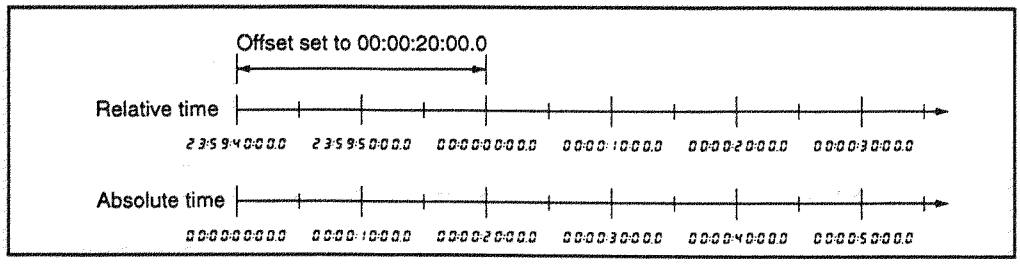
> **Tip:** *You may find it much more efficient to use the numeric keypad to enter a large offset value.*

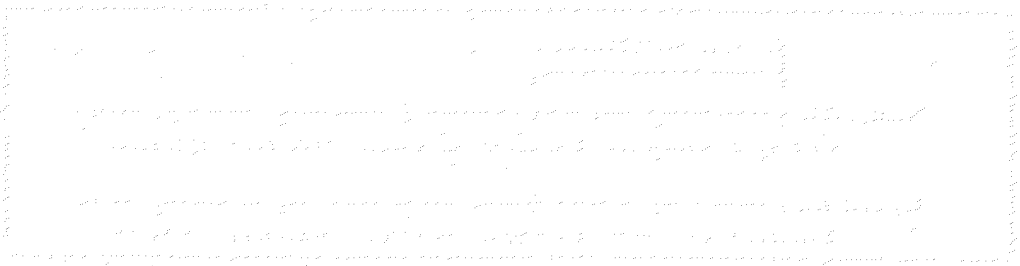
If you made a mistake, press the RESET key to switch back to the current setting of the offset value.

4) Press the STORE/ENT key.

Relative time will now be displayed with the specified offset.

The following diagram shows relative time with a 20 second offset:





10 Editing

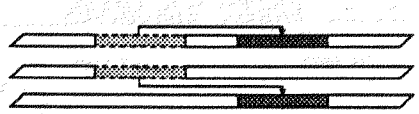
This chapter describes the editing functions.

The DR16 has nine edit functions: copy, copy+insert, move, move+insert, insert, erase, delete, slip, and slip track:

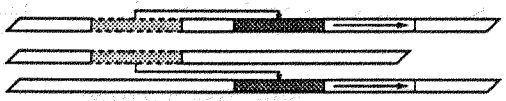
Copy the specified section to any track. Material at the destination is overwritten.

Copy+Insert the specified section to any track. Subsequent material is moved forward.

Move the specified section to any track. Material at the destination is overwritten.



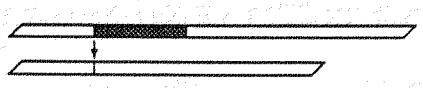
Move+Insert the specified section to any track. Subsequent material is moved forward.



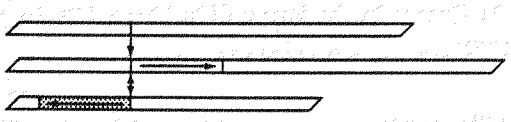
Insert a blank section of a specified length and move subsequent material forward.

Erase the specified section.

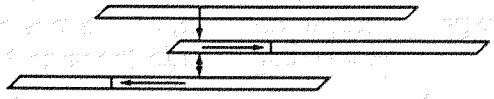
Delete the specified section and move subsequent material backward.



Slip the material after the specified time forward or backward to the edit point.



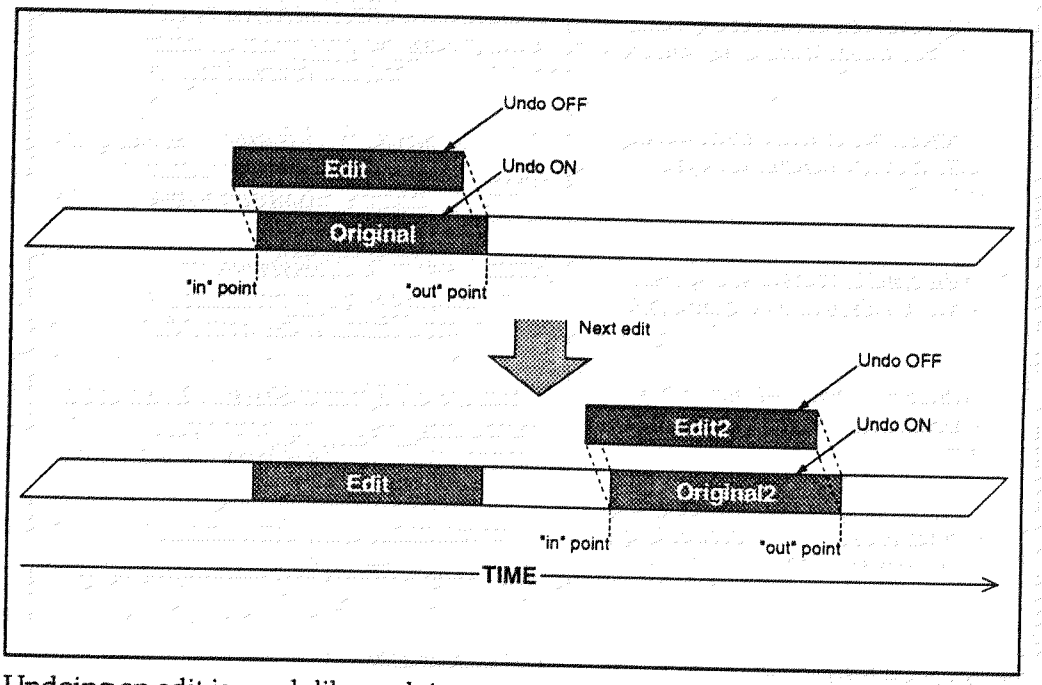
Slip Track the entire track forward or backward to the edit point.



Undoing an Edit

Before looking at each edit function, you need to know how to undo an edit. This will be useful when edits do not turn out as planned. It also gives you the freedom to experiment with edits — using the undo function to "compare" a newly edited version with the original.

The following diagram shows how the edit undo function works:



Undoing an edit is much like undoing a recording. See "Recording Undo" on page 49.

After each edit, the DR16 will play the modified material.

1) **To undo an edit, press the UNDO key.**
The indicator in the key will light up. While this indicator is lit, the DR16 will play the material as it was before the edit.

2) **To switch back to the edited material, press the UNDO key again.**
Before performing another edit, you must decide whether you want to keep the edit or not. Once another edit is made, the undo function will apply to the new edit.

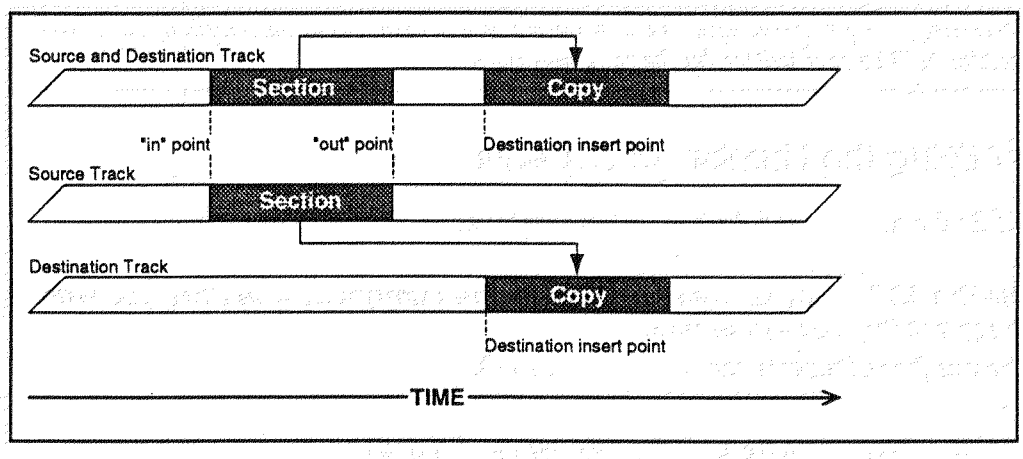
Once you have decided, leave the undo function set as required.

Copy

The copy function allows you to make multiple copies of a section of audio and re-position it elsewhere. You can copy material from one section of a track to another, or across tracks.

> **Note:** *The copy operation will overwrite any material that may be present at the destination insert point.*

The following diagram illustrates the copy procedure:



Specifying the Copy Source Section

The start point and end point of the section to be copied are identified using the "in" point and "out" point respectively.

1) **Set the "in" and "out" points to define the copy source section.**
See "Specifying the "in" Point and "out" Point" on page 28.

Press the IN key to check the "in" point and press the OUT key to check the "out" point.

To play the specified section, press the IN->OUT key. You can also use the TO, OVER, and FROM keys to check the "in" and "out" points. See "Special Play Keys" on page 56.

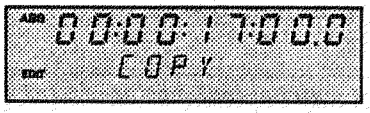
Specifying the Destination Insert Point

1) **Locate to the desired position for the destination.**
Refer to the "Locate Functions" on page 81.

> **Tip:** *Prior to doing any serious editing, it is a good idea to mark some locate points using the functions described in the "Locate Functions" on page 81. For example, mark the start of verses and other relevant sections. Having done so, you will find it much easier to locate to new positions for copying, moving, and inserting edits.*

2) Press the EDIT key to select the Copy function.

The LED beside the key will light up, and you will see a display similar to the following:



3) Press the STORE/ENT key.

The destination insert point will be stored.

> **Warning:** *Any material after the destination insert point up to the length of the source section will be overwritten by the copy operation.*

Specifying the Number of Repeats

While the message REPEAT 01 is displayed:

1) Use the JOG/SHUTTLE control to specify the number of times that you want to repeat the copied section.

The number of repeats can be set from 1 to 99.

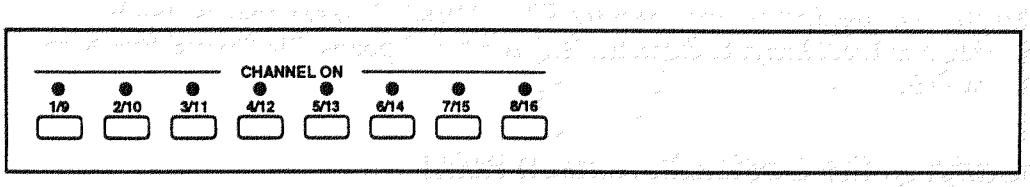
Selecting the Source & Destination Tracks

The CHANNEL ON keys are used to select the copy source, and the TRACK REC(INPUT SELECT) keys are used to select the copy destination. (You will also need to use the 9-16 key if you wish to copy to or from Tracks 9 through 16.)

You can copy one track, or a number of tracks simultaneously.

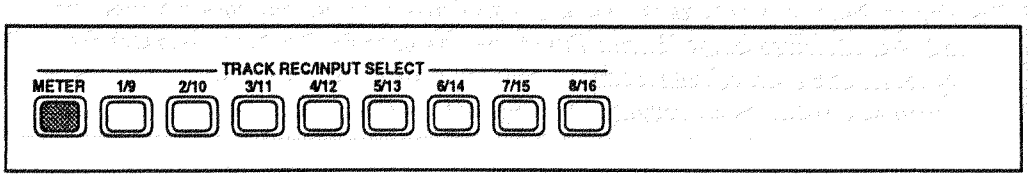
1) Use the CHANNEL ON keys (and the 9-16 key, if necessary) to select the copy source tracks.

The corresponding indicators will light up.



2) Use the TRACK REC(INPUT SELECT) keys (and the 9-16 key, if necessary) to select the copy destination tracks.

The corresponding keys will light up.



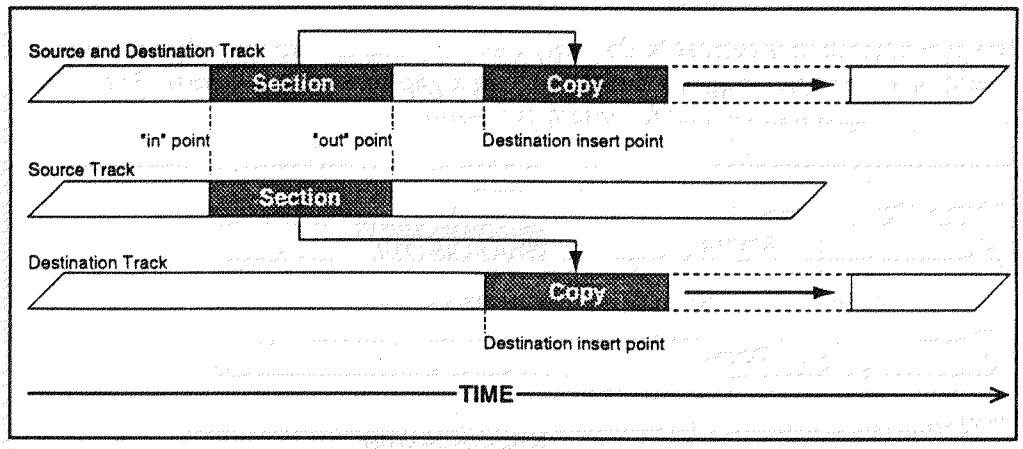
Executing the Copy

1) **Press the STORE/ENT key to execute the copy.**
When the DR16 has completed the copy operation, the message DONE will momentarily appear on the display.

The LED beside the EDIT key will switch off and the previous mode restored.

Copy+Insert

The copy+insert function works basically the same as the copy function. However, unlike copy, the copy+insert function moves any existing material at the specified destination behind the new material rather than overwriting it. The following diagram illustrates the copy+insert procedure:



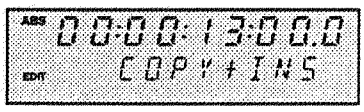
The following steps are similar to the operation detailed in "Copy" on page 93. Only an outline is provided here. Refer to the previous steps for explanations.

1) **Set the "in" and "out" points to define the copy source section.**
See "Specifying the "in" Point and "out" Point" on page 28.

2) **Locate to the desired position for the destination insert point.**
Refer to the "Locate Functions" on page 81.

3) **Press the EDIT key to enter Edit Mode.**
The EDIT indicator will light up

4) **Use the JOG/SHUTTLE control to select the Copy+Insert function.**
You will see a display similar to the following:



5) **Press the STORE/ENT key.**

6) **Use the JOG/SHUTTLE control to specify the number of repeats.**

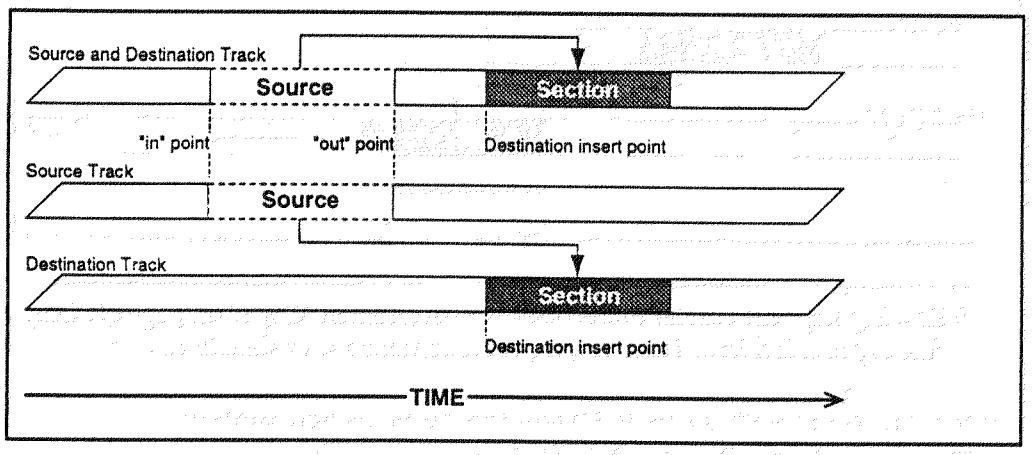
7) **Use the CHANNEL ON keys (and the 9-16 key, if necessary) to select the copy source tracks.**

8) **Use the TRACK REC(INPUT SELECT) keys (and the 9-16 key, if necessary) to select the copy destination tracks.**

9) **Press the STORE/ENT key to execute the copy.**
When the DR16 has completed the copy operation, the message *DONE* will momentarily appear on the display. The LED beside the EDIT key will switch off and the previous mode will be restored.

Move

The move function is similar to the copy function. The difference is that the move operation deletes the original section, leaving a gap on the source track. The following diagram illustrates the move procedure:



The following steps are similar to "Copy" on page 93, therefore only an outline is provided here.

1) **Set the "in" and "out" points to define the move source section.**
See "Specifying the "in" Point and "out" Point" on page 28.

2) **Locate to the desired position for the destination insert point.**
Refer to the "Locate Functions" on page 81.

3) **Press the EDIT key to enter Edit Mode.**
The EDIT indicator will light up

4) **Use the JOG/SHUTTLE control to select the Move function.**
You will see a display similar to the following:

5) **Press the STORE/ENT key.**

6) **Use the JOG/SHUTTLE control to specify the number of repeats.**

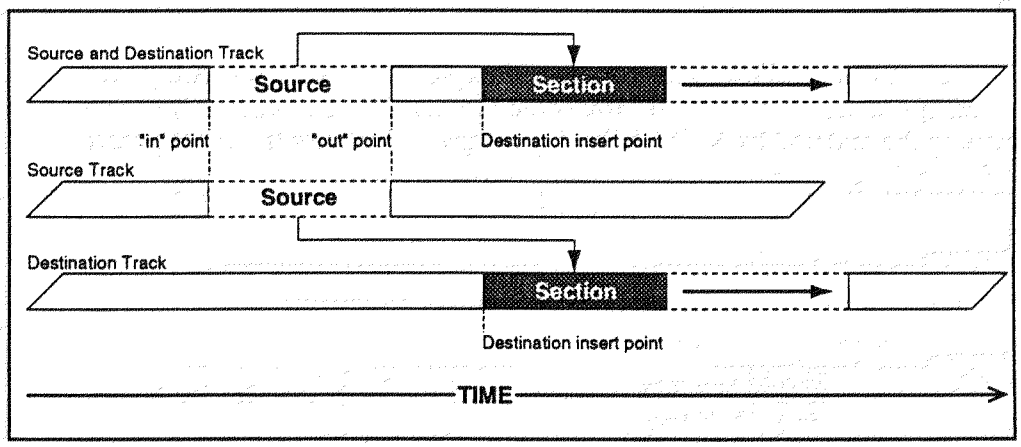
7) **Use the CHANNEL ON keys (and the 9-16 key, if necessary) to select the move source tracks.**

8) **Use the TRACK REC(INPUT SELECT) keys (and the 9-16 key, if necessary) to select the move destination tracks.**

9) **Press the STORE/ENT key to execute the move.**
When the DR16 has completed the move operation, the message DONE will momentarily appear on the display. The LED beside the EDIT key will switch off and the previous mode will be restored.

Move+Insert

The move+insert function works basically the same as the move function. However, unlike move, the move+insert function moves any existing material at the specified destination behind the new material rather than overwriting it. The following diagram illustrates the move+insert procedure:



The following steps are similar to "Copy" on page 93, therefore only an outline is provided here.

1) **Set the "in" and "out" points to define the move source section.**
See "Specifying the "in" Point and "out" Point" on page 28.

2) **Locate to the desired position for the destination insert point.**
Refer to the "Locate Functions" on page 81.

3) **Press the EDIT key to enter Edit Mode.**
The EDIT indicator will light up

4) **Use the JOG/SHUTTLE control to select the Move+Insert function.**
You will see a display similar to the following:

5) **Press the STORE/ENT key.**

6) **Use the JOG/SHUTTLE control to specify the number of repeats.**

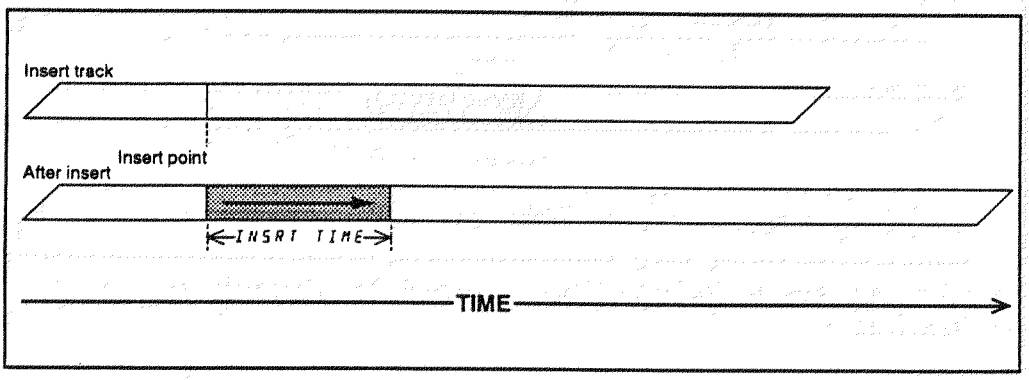
7) **Use the CHANNEL ON keys (and the 9-16 key, if necessary) to select the move source tracks.**

8) **Use the TRACK REC(INPUT SELECT) keys (and the 9-16 key, if necessary) to select the move destination tracks.**

9) **Press the STORE/ENT key to execute the move.**
When the DR16 has completed the move operation, the message DONE will momentarily appear on the display. The LED beside the EDIT key will switch off and the previous mode will be restored.

Insert

The insert function allows you to place a blank section into a track, similar to inserting a length of leader tape. You could also use it to time-correct a track by pushing the material back. The following diagram illustrates the insert procedure:



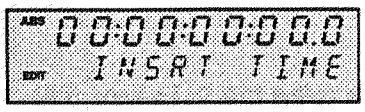
This procedure is different than the preceding edit functions because you do not need to set an "in" point or "out" point.

1) **To set the insert point, locate to the desired position.**
Refer to the "Locate Functions" on page 81.

2) **Press the EDIT key to enter Edit Mode.**
The EDIT indicator will light up

3) **Use the JOG/SHUTTLE control to select the Insert function.**
You will see a display similar to the following:

4) **Press the STORE/ENT key.**
You will see a display similar to the following:



5) **Use the JOG/SHUTTLE control or the numeric keypad to specify the length of the insert.**
The insert time is shown on the time display.

6) **Use the TRACK REC(INPUT SELECT) keys (and the 9-16 key, if necessary) to select the insert tracks.**

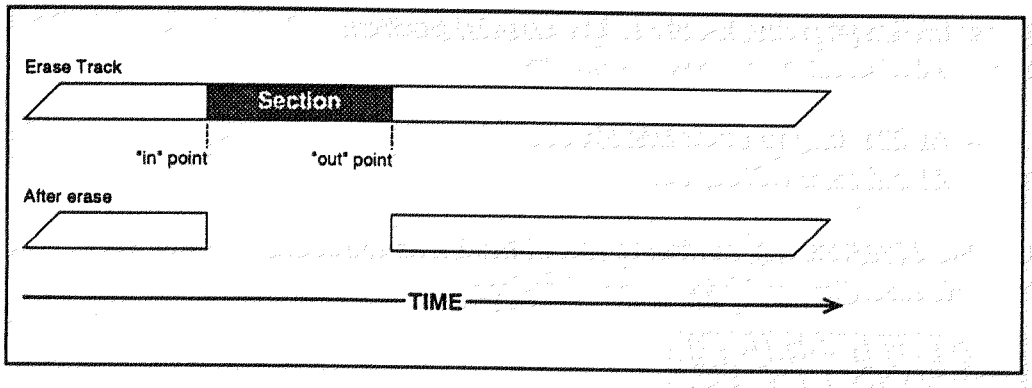
7) **Press the STORE/ENT key to execute the insert.**
When the DR16 has completed the insert operation, the message DONE will momentarily appear on the display. The LED beside the EDIT key will switch off and the previous mode will be restored.

Erase

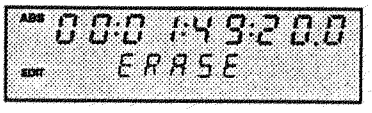
The erase function allows you to remove a section of audio from a track, but maintain the time gap. You could use it to delete an unwanted breath from a vocal track or a bad note from the keyboard track — where the erased track must stay in sync with other recorded material. The following diagram illustrates the erase procedure:

1) **Set the "in" and "out" points to define the section to be erased.**
See "Specifying the "in" Point and "out" Point" on page 28.

2) **Press the EDIT key to enter Edit Mode.**
The EDIT indicator will light up



3) **Use the JOG/SHUTTLE control to select the Erase function.**
You will see a display similar to the following:

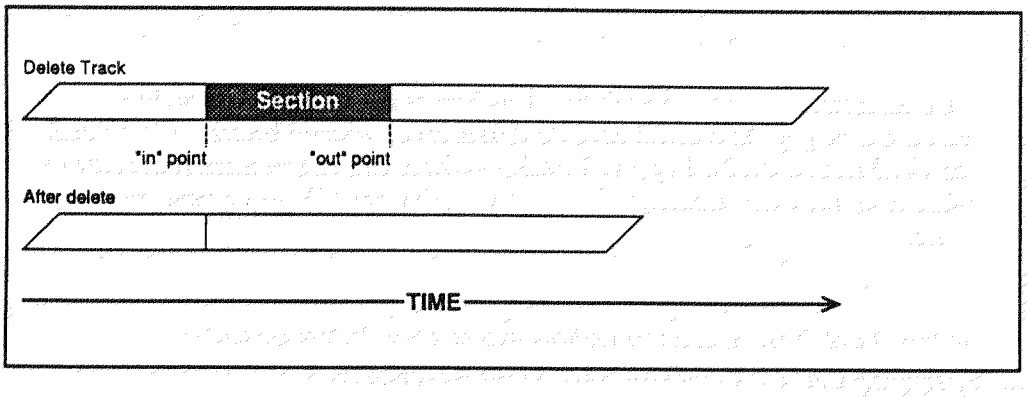


4) **Use the TRACK REC(INPUT SELECT) keys (and the 9-16 key, if necessary) to select the tracks you want to erase.**

5) **Press the STORE/ENT key to erase the tracks.**
When the DR16 has completed the erase operation, the message DONE will momentarily appear on the display. The LED beside the EDIT key will switch off and the previous mode restored.

Delete

The delete function works basically the same as the erase function. However, the delete function also moves any subsequent material back. The following diagram illustrates the delete procedure:



1) **Set the "in" and "out" points to define the section to be deleted.**
See "Specifying the "in" Point and "out" Point" on page 28.

2) **Press the EDIT key to enter Edit Mode.**
The EDIT indicator will light up

3) **Use the JOG/SHUTTLE control to select the Delete function.**
You will see a display similar to the following:

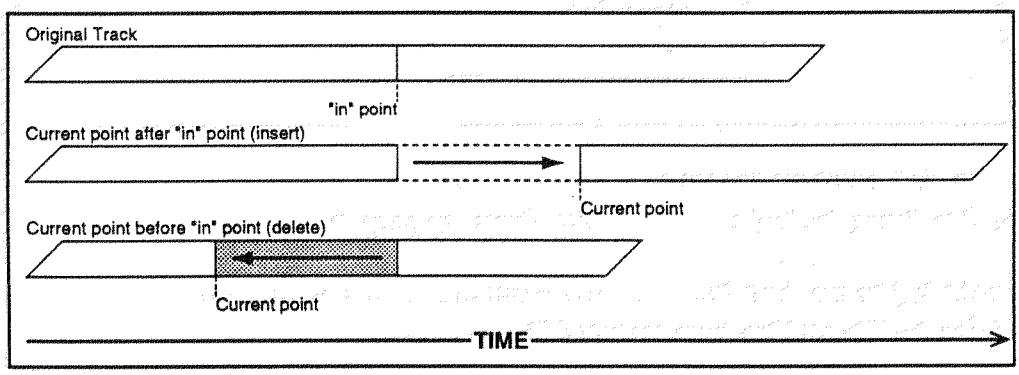
4) **Use the TRACK REC(INPUT SELECT) keys (and the 9-16 key, if necessary) to select the tracks you want to delete.**

5) **Press the STORE/ENT key to delete the tracks.**
When the DR16 has completed the delete operation, the message DONE will momentarily appear on the display. The LED beside the EDIT key will switch off and the previous mode will be restored.

> **Note:** *When the delete function has completed, the "out" point will be set to the same location as the "in" point. This will prevent you from unintentionally removing another section of material.*

Slip

The slip function moves all the audio forward or backwards from the marked "in" point to the current position. If the current position is beyond the "in" point, a section of blank audio is inserted ("Insert" on page 98). However, if the current position is before the "in" point, the material between the two points is deleted ("Delete" on page 100). The following diagram illustrates the slip function:

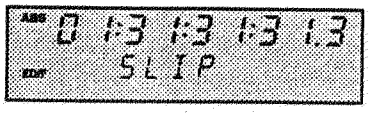


1) **Set the "in" point to mark the start of the audio you want to slip.**
See "Specifying the "in" Point and "out" Point" on page 28.

2) **Locate to the position to which you want to slip the audio.**
Refer to the "Locate Functions" on page 81.

3) **Press the EDIT key to enter Edit Mode.**
The EDIT indicator will light up

4) **Use the JOG/SHUTTLE control to select the Slip function.**
You will see a display similar to the following:

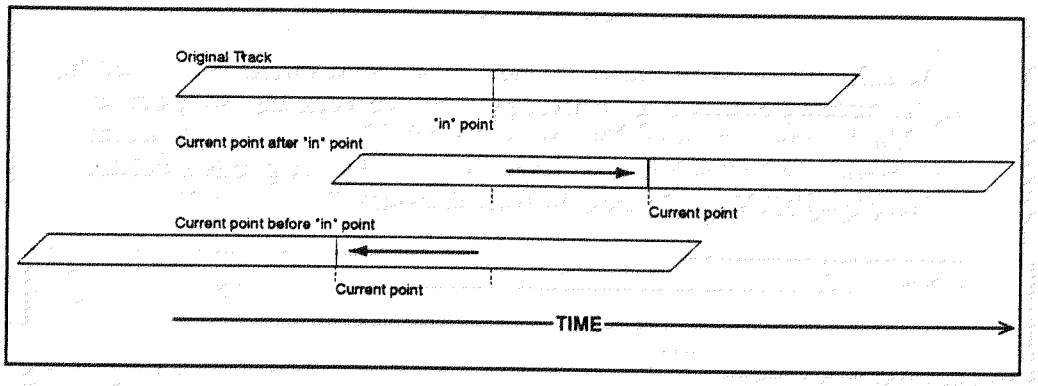


5) **Use the TRACK REC(INPUT SELECT) keys (and the 9-16 key, if necessary) to select the tracks you want to slip.**

6) **Press the STORE/ENT key to slip the tracks.**
When the DR16 has completed the slip operation, the message DONE will momentarily appear on the display. The LED beside the EDIT key will switch off and the previous mode will be restored.

Slip Track

The slip track function moves all audio on the current track forward or backward so that the audio at the marked "in" point is moved to the current position. The following diagram illustrates the slip track function:

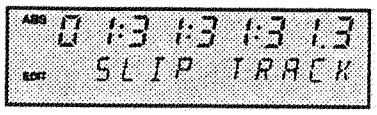


1) **Set an "in" point on the track you want to slip.**
See "Specifying the "in" Point and "out" Point" on page 28.

2) **Locate to the position to which you want to move the "in" point.**
Refer to the "Locate Functions" on page 81.

3) **Press the EDIT key to enter Edit Mode.**
The EDIT indicator will light up

4) **Use the JOG/SHUTTLE control to select the Slip Track function.**
You will see a display similar to the following:



5) Use the TRACK REC(INPUT SELECT) keys (and the 9-16 key, if necessary) to select the track you want to slip.

6) Press the STORE/ENT key to slip the track.

When the DR16 has completed the slip operation, the message DONE will momentarily appear on the display. The LED beside the EDIT key will switch off and the previous mode will be restored.

11 Projects

The DR16 enables you to create multiple project files on the hard disk. A project includes the audio data, along with the associated snapshots, locate points, offset time, and other settings.

Once you have completed work on one project, you can move on to another project without first copying the finished project to a DAT recorder, as long as you have sufficient space available on your hard disk(s).

Takes 1 to 5 can be shared by multiple projects. For example, assume that you have reserved the entire current project to one of the takes. You can then copy the contents of the take to a different project by loading the project and committing the take.

You can also use DR16 project files on the Akai DD1500. (See "Data Compatibility with the DD1500" on page 122 for more information.) In this case, the DD1500 will handle the file as a DD1500 project.

This chapter explains how to create, load, and delete project files.

Creating a New Project

You can create new project files on your hard disk.

To create a new project file:

1) **Press the SUB-MENU key.**
The indicator in the key will flash and the text SUB-MENU will appear on the display.

2) **Press the 4(UTILITY) key - numeric keypad.**
The message LOAD PROJ will appear on the display.

3) **Rotate the JOG/SHUTTLE control to select the New Project function.**
The message NEW PROJ will appear on the display.

4) **Press the STORE/ENT key.**
The message SCSI ID 0 will appear on the display, showing the SCSI ID number of the currently-selected hard drive.

5) **Rotate the JOG/SHUTTLE control to select the SCSI ID number of the hard disk on which you want to start the new project.**
The SCSI ID numbers range from 0 to 6. The internal hard disk uses SCSI ID 0. External hard disks can be assigned SCSI ID numbers 1 through 6. See "SCSI IDs" on page 111.

6) **Press the STORE/ENT key.**
A default name for the current project, such as DR16 DATA1, will appear on the display.

7) Use the JOG/SHUTTLE control to rename the project, if you wish.
You can assign a name of up to 10 characters or numbers (refer to the character set chart on page "141").

8) Press the STORE/ENT key.
The message DONE appears momentarily on the display.

The DR16 is now operating under the new project name.

> Note: *If the name you try to assign already exists on the selected hard disk, the message* BAD NAME *will appear on the display. In this case, rename the project and press the STORE/ENT key.*

Loading Project Files

You can load existing project files from any connected hard disk.

To load a project file:

1) Press the SUB-MENU key.
The indicator in the key will flash and the text SUB-MENU will appear on the display.

2) Press the 4(UTILITY) key - numeric keypad.
The message LOAD PROJ will appear on the display.

3) Press the STORE/ENT key.
The message SCSI ID 0 will appear on the display.

4) Rotate the JOG/SHUTTLE control to select the SCSI ID number of the hard disk that contains the project you want to load.
The SCSI ID numbers range from 0 to 6. The internal hard disk uses SCSI ID 0. External hard disks can be assigned SCSI ID numbers 1 through 6. See "SCSI IDs" on page 111.

5) Press the STORE/ENT key.
The name of a project located on the specified disk, such as DR16 DATA1, will appear on the display.

6) Rotate the JOG/SHUTTLE control to select the project you want to load.

7) Press the STORE/ENT key.
The message DONE appears momentarily on the display.

The DR16 loads the project.

Deleting Project Files

You can delete existing project files from any connected hard disk.

To delete a project file:

1) **Press the SUB-MENU key.**
The indicator in the key will flash and the text SUB-MENU will appear on the display.

2) **Press the 4(UTILITY) key - numeric keypad.**
The message LOAD PROJ will appear on the display.

3) **Rotate the JOG/SHUTTLE control to select the Delete Project function.**
The message DEL PROJ will appear on the display.

4) **Press the STORE/ENT key.**
The message SCSI ID 0 will appear on the display.

5) **Rotate the JOG/SHUTTLE control to select the SCSI ID number of the hard disk that contains the project you want to delete.**
The SCSI ID numbers range from 0 to 6. The internal hard disk uses SCSI ID 0. External hard disks can be assigned SCSI ID numbers 1 through 6. See "SCSI IDs" on page 111.

6) **Press the STORE/ENT key.**
The name of a project located on the specified disk, such as DR16 DATA1, will appear on the display.

7) **Rotate the JOG/SHUTTLE control to select the project you want to delete.**

8) **Press the STORE/ENT key.**
The message SURE ?? appears momentarily on the display.
(If you do not want to delete the project, press the ESCAPE key.)

9) **Press the STORE/ENT key.**
The message DONE appears momentarily on the display.
The DR16 deletes the specified project.

> **Note:** *You cannot delete the current project. If you try to delete the current project, the message* CAN'T DEL *will appear momentarily on the display. If you want to delete the current project, first load a different project and try again.*

12 Hard Disks

This chapter examines hard disks. Your DR16 should already have an optional internal hard disk installed, so you have everything you need to start recording. If the hard disk has not yet been formatted, see "Formatting Disks" on page 115.

If you want to increase the available recording time by adding more storage, read through this chapter to gain a better understanding of how the DR16 works with hard disks. When upgrading, you can keep the internal hard disk and just add an external hard disk via the SCSI-A bus. Alternatively, you could replace the internal hard disk with a larger one.

Only certain hard disks can be used with the DR16, so please consult your Akai professional dealer.

Choosing a Hard Disk

There are many types of hard disks currently available, each with slightly different specifications. Your Akai professional dealer will be able to provide you with information about which hard disks are best for use with the DR16. The following points should also be borne in mind:

- Is the hard disk fitted with two SCSI connectors? This will allow you to add more hard disks simply by connecting to the SCSI-A bus daisy chain.
- Are the SCSI connectors 50-way Amphenol types like the one on the rear panel of the DR16? Some manufacturers use different types of connectors for SCSI connections. Although there are connection adaptors available, it is much simpler to standardize with one type.
- Can the SCSI ID number be set? Some of the earlier external disk drives were not fitted with SCSI ID switches. If each hard disk can be set to any SCSI ID, it allows greater flexibility when setting up a SCSI daisy chain.
- Does it have internal or external SCSI termination? Hard disks supplied with an external terminator can be connected at any position in a SCSI daisy chain. Some hard disks that have a fixed internal terminator always have to be connected at the end of the SCSI daisy chain, thus reducing setup flexibility. This is especially awkward when you have two such hard disks.
- Is the access time fast enough? Most currently available hard disks have relatively quick access times. However, some older drives can be quite slow. When the DR16 is playing and recording at the same time, the disk drive is continuously reading and writing data. If the hard disk's average seek time is slower than 10 ms, performance may be affected.
- Is the data transfer rate high enough? This rate is usually measured in Megabits per second (Mbit/s). A transfer rate slower than 2.0 MByte/s (16 Mbit/s) may affect the performance of the DR16.

Hard Disk Size

The total available recording time depends on the total size of all storage media — the internal hard disk and any external hard disks connected via the SCSI-A bus. As can be seen from the table below, the sampling frequency also affects the available time. Basically, with a higher sampling frequency, less time is available. This is because higher sampling frequencies record more samples onto disk. In turn, this provides a better audio bandwidth, but it also requires more storage space.

The "1 Track" column shows how many track minutes are available with some typical sizes of hard disk. A track minute indicates the total time available if only one track is recorded. The "16 Track" column shows the amount of time that is available to each track, and is just the "1 Track" column value divided by 16. For example, 1.2 GB at 48 kHz provides approximately 212 track minutes (3 hours 32 minutes), that is about 13 minutes per track. However, each track is not restricted to 13 minutes, and can use as much or as little of the available storage media as required until it has all been used. So, for example, one track may use 32 minutes, another track 23 minutes, and so forth.

Hard Disk Size	Available Minutes:Seconds (Approx.)					
	32 kHz		44.1 kHz		48 kHz	
	16 track	1 track	16 track	1 track	16 track	1 track
4 GB	66:24	1062:40	48:12	771:06	44:16	708:36
2 GB	33:12	531:20	24:06	385:33	22:08	354:18
1.2 GB	19:55	318:48	14:27	231:20	13:17	212:35
650 MB	10:47	172:41	7:50	125:18	7:12	115:08
330 MB	5:29	87:40	3:58	63:37	3:39	58:27
240 MB	3:59	63:46	2:53	46:16	2:39	42:31
128 MB	2:09	34:32	1:32	24:40	1:25	22:40
100 MB	1:40	26:34	1:12	19:16	1:06	17:42

Note: *There is no column for 44.056 kHz in the table above. You will find its disk utilization values are very close to 44.1 kHz.*

The DR16 can record and play back a maximum of 24 consecutive hours per project (2 3:5 9:5 9:0 0.0). It is not possible to record or play back beyond absolute time 24 hours (midnight 0:00).

Note: *If you are handling a large quantity of data, the display may show the message* DISK SLOW. *This is due to a DR16 performance limitation. In this case, we recommend that you use a faster hard disk or install optional "Wave Buffer Memory."*

SCSI

The DR16 uses the SCSI connection format for connecting external hard disks. Pronounced "scuzzy," SCSI (Small Computer System Interface) is often used for connecting computer peripherals such as hard disks, scanners, etc. It provides a relatively fast data transfer rate, making it ideal for digital audio applications.

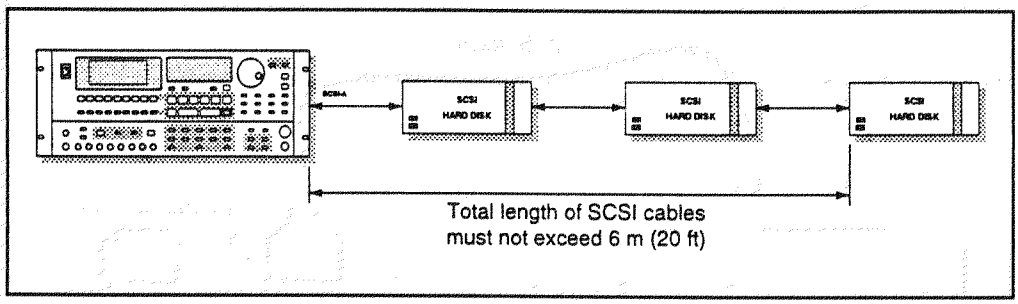
Up to eight devices can be connected in a SCSI daisy chain. One device acts as the controller, and the others as slaves. The controller can communicate with any slave device. Typically, the slave devices communicate with the controller only. In a DR16 system, the DR16 functions as the controller, writing to and reading from the connected slaves.

SCSI-A & SCSI-B

The DR16 has two SCSI buses: SCSI-A and SCSI-B. The SCSI-A bus is used to connect external hard disks for recording. The SCSI-B bus is for connecting to personal computers. The optional IB-801S SCSI-B board must be installed to use the SCSI-B bus.

SCSI Cables

Use only high-quality SCSI cables when connecting SCSI devices. Cables are available in a variety of lengths; however, you should pay particular attention to the total length of the SCSI daisy chain. It is not the length of each cable that is important, but the total length of all cables used in the daisy chain. The total length must not exceed 6 meters (20 ft.).

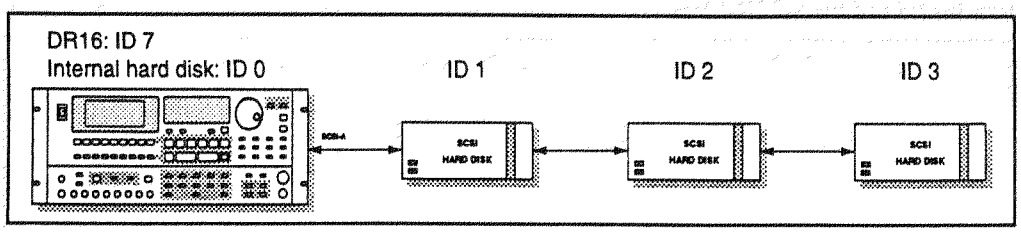


SCSI IDs

Each SCSI device in the SCSI daisy chain is assigned its own ID number. SCSI-A ID numbers can be set from 0 to 7. The DR16 itself uses ID 7, and the internal hard disk ID 0. Use ID numbers other than 0 and 7 for hard disks connected via SCSI-A.

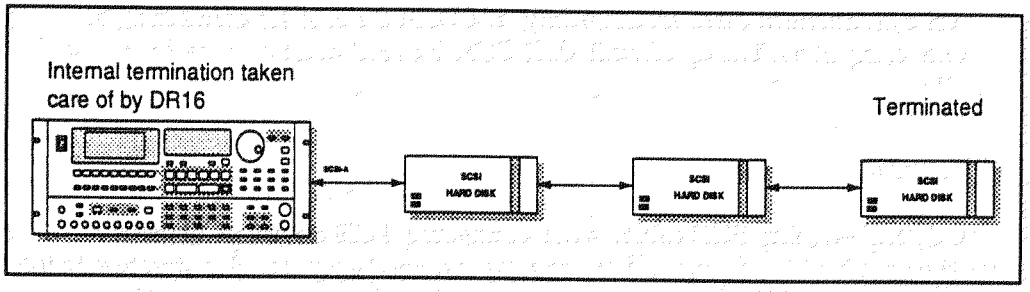
Caution: *If you set an external hard disk's ID number to that used by the internal hard disk, the DR16 will not be able to detect an error, so no error message will appear. In this case, the DR16 may appear to work correctly, but recording will not be performed correctly, and existing material may be destroyed. You must be very careful when setting SCSI ID numbers.*

The following diagram shows how SCSI IDs should be set for a typical DR16 SCSI daisy chain:

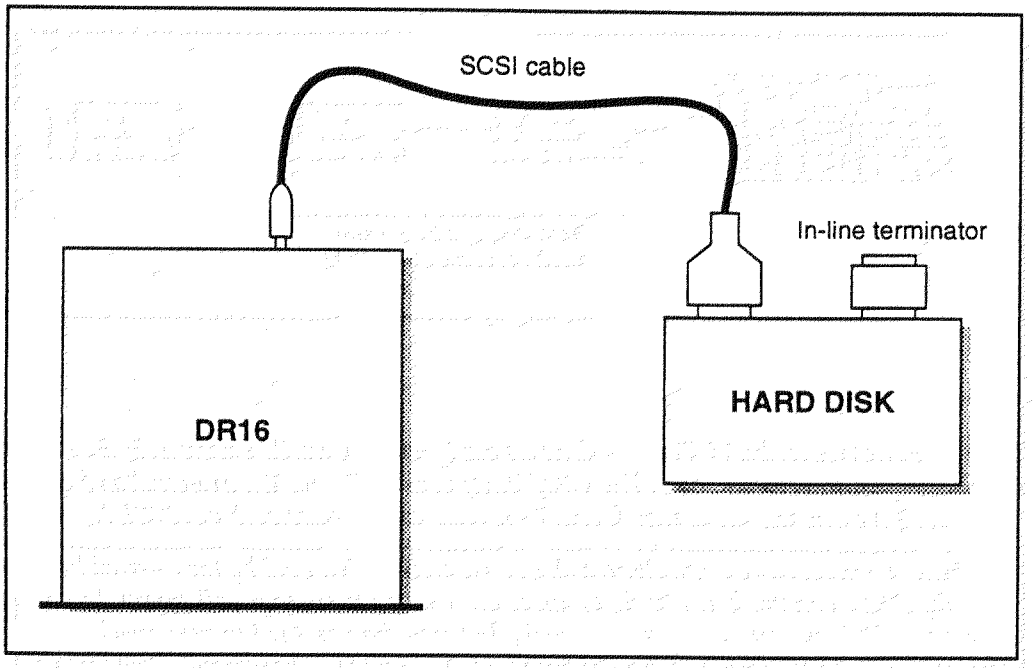


SCSI Termination

The ends of a SCSI daisy chain must be terminated correctly. Otherwise, data errors, system crashes, etc., may occur. Termination at the DR16 end of the chain is taken care of by the DR16. At the other end of the chain you must fit a terminator. Some SCSI devices have a terminator built-in. This type of device must always be connected at the end of the daisy chain. Other devices are supplied with an in-line type terminator that you must connect to the unused SCSI connector. The following diagram shows how a SCSI daisy chain should be terminated:



The following diagram shows an example of an in-line terminator connected to a hard disk:



Note: *The terminator switch on the rear panel of the DR16 is used to terminate the SCSI-B bus, which you can use if you add the optional IB-801S SCSI-B board to interface with a personal computer. The terminator switch is not related to the termination of the SCSI-A bus.*

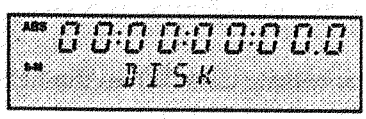
Checking for Disks

To check the status of a hard disk connected to SCSI-A bus:

1) **Press the SUB-MENU key.**
The indicator in the key will flash and the text SUB-MENU will appear on the display.

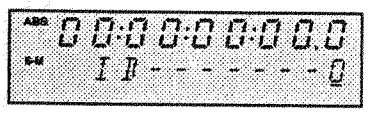
2) **Press the 1(DISK) key - numeric keypad.**
The message TIME will appear on the display.

3) **Use the JOG/SHUTTLE control to select the Disks function.**
You will see a display similar to the following:



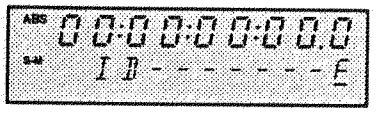
4) **Press the STORE/ENT key.**
The message SCANNING will momentarily appear on the display.

When the scan has completed, the DR16 will display the SCSI ID of all the connected hard disks, similar to the following:

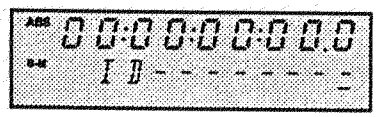


This display indicates the DR16 found one disk at ID 0, the address of the internal hard disk.

Here are some other examples:



This display indicates the DR16 found one disk at ID 0, but it is not correctly formatted.



This display indicates the DR16 found no disks. It probably indicates that the disk at ID 0 is not connected properly.

If you have connected a hard disk, but its SCSI ID does not appear, make sure that all SCSI IDs are set correctly, all SCSI cables are connected correctly, and the hard disk is powered on.

External Hard Disk Operating Precautions

- Before connecting a hard disk, make sure that the DR16 and hard disk are powered off. If a hard disk is connected with its power on it could be damaged.
- Always power on the external hard disks before the DR16. Otherwise, the DR16 will not recognize them.
- When you connect a hard disk that has already been used for recording to another DR16, or connect then disconnect it from the same DR16, erase all the material on the disk or format it before recording any new material.
- New unformatted disks can be connected to the DR16 quite safely, and will not be used until formatted. The letter "F" will appear on the display when the DR16 performs a hard disk search.
- Do not set an external hard disk's SCSI ID number to that used by the internal hard disk. Operation will be unpredictable and any recorded material may be destroyed. See "SCSI IDs" on page 111.
- Do not power off a hard disk while it is accessing data. When the BUSY indicator on the DR16 display is lit, it indicates that a hard disk is being accessed.
- Do not move or disturb a hard disk while it is powered on, especially when it is accessing data.
- Hard disks should be mounted horizontally or vertically when in use. See the hard disk's operating manual for more details.

Formatting Disks

New hard disks must be formatted before you can use them for recording. Formatting prepares a disk for storing digital audio data. External disks and the internal hard disk are identified by their SCSI ID. Make sure that you know the SCSI ID of the disk you want to format before starting this procedure.

You can also use this function to format existing disks.

To format a disk:

1) Press the SUB-MENU key.
The indicator in the key will flash and the text SUB-MENU will appear on the display.

2) Press the 1(DISK) key - numeric keypad.
The message TIME will appear on the display.

3) Use the JOG/SHUTTLE control to select the Format function.
You will see a display similar to the following:

4) Press the STORE/ENT key.
The message SCSI ID 0 will appear on the display.

5) Use the JOG/SHUTTLE control to select a SCSI ID.
The selected SCSI ID should correspond to that of the disk that you want to format.

> **Caution:** *If you have a number of disks connected, make sure that you select the correct SCSI ID.*

6) Press the STORE/ENT key.
The message SURE ?? will appear on the display.

> **Caution:** *When you format a disk, ANY EXISTING DATA WILL BE ERASED – PERMANENTLY. Please be certain that this is what you intend to do. Back up any data that you want to keep before formatting. See "Backup and Restore" on page 125.*

7) If you are sure, press the STORE/ENT key again to start formatting.
As the DR16 formats the disk, the message VERIFYING alternating with the message GOOD 00000 (indicating the current disk block number) will appear on the display. The disk block numbers count up as the disk is formatted.

If a bad block is found on the disk, the message BAD BLOCK appears on the display.

Disk formatting does take time. The larger the disk, the longer it will take.

If you decide you do not want to format the disk, press the ESCAPE key to cancel the format function.

When the disk format is complete, the message DONE will momentarily appear on the display. The previous mode will be restored.

> **Note:** *If the DR16 was unable to format the drive, because, for example, you selected a SCSI ID that had no corresponding disk, the message FAIL will appear on the display.*

Erasing Disks

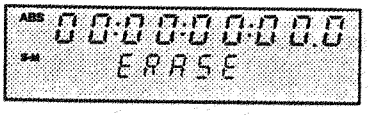
This function allows you erase all material on a disk before starting a new session. You may want to back up the existing material for future use before proceeding. See "Backup and Restore" on page 125.

To erase a disk:

1) **Press the SUB-MENU key.**
The indicator in the key will flash and the text SUB-MENU will appear on the display.

2) **Press the 1 (DISK) key - numeric keypad.**
The message TIME will appear on the display.

3) **Use the JOG/SHUTTLE control to select the Erase function.**
You will see a display similar to the following:



4) **Press the STORE/ENT key.**
The message SCSI ID 0 will appear on the display.

5) **Use the JOG/SHUTTLE control to select a SCSI ID.**
The selected SCSI ID should correspond with that of the disk that you want to erase.

> **Caution:** *If you have a number of disks connected, be certain to select the correct SCSI ID.*

6) **Press the STORE/ENT key.**
The message SURE ?? will appear on the display.

> **Caution:** *This function erases any existing data from the disk– PERMANENTLY. Please be certain that this is what you intend to do. Back up any data that you want to keep before erasing. See "Backup and Restore" on page 125.*

7) **If you are sure, press the STORE/ENT key again to start erasing.**
As the DR16 erases the disk, the message ERASING will appear on the display.

Erasing the disk does take time. The larger the disk, the longer it will take.

If you decide you do not want to erase the disk, press the ESCAPE key to cancel the erase function

When the disk erasure is complete, the message DONE will momentarily appear on the display. The previous mode will be restored.

Note: *If the DR16 was unable to erase the drive, the message FAIL will appear on the display.*

Optimizing Your Hard Disks

Editing and recording on the DR16 is non-destructive, except in destructive recording mode. (See "Setting the Recording Mode" on page 50.) This means that when you record new material over a location with existing data, the DR16 does not erase the existing material. Instead, it allocates space elsewhere on the hard disk to store the new material and marks the previous location as overwritten. The Undo and Take functions take advantage of this feature to allow you to choose the portion of material you want to keep. In order for your DR16 to operate as efficiently as possible, it is necessary to leave these discarded edits on the hard drive.

Occasionally, you will need to remove this unnecessary data to free some disk space so that you can continue recording. The DR16 provides you with two functions that allow you to free up disk space that was consumed by the editing process: the Cleanup function and the Minimize function.

Cleanup Function

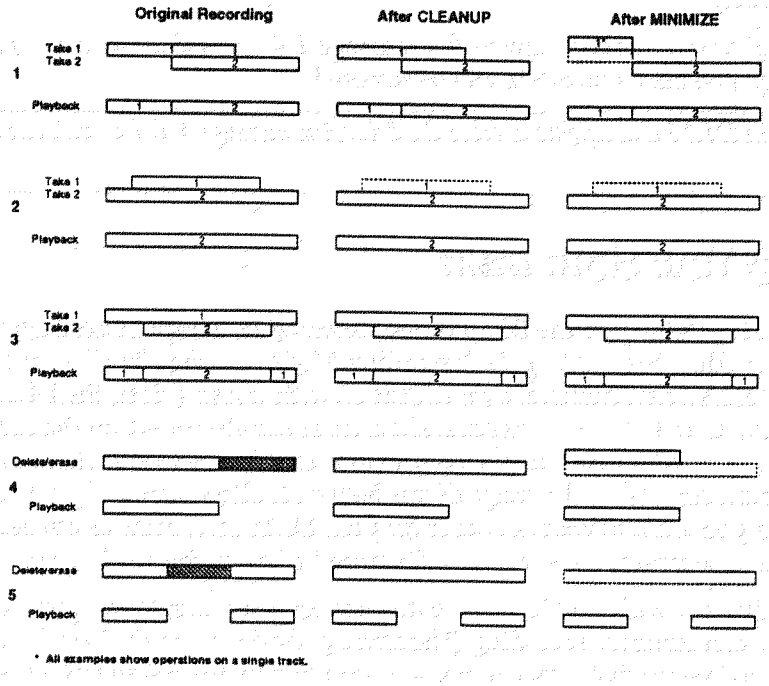
The Cleanup function deletes an entire take from the disk only if the entire take will not be played back (because it has been replaced by other takes). If any portion of the take will be played back, the take will not be deleted.

Minimize Function

The Minimize function deletes that portion of a take that will not be played back (because it has been replaced by other takes). It does this by copying the portion of the take that can be played back to a new take and then deletes the old take.

The Minimize function will free more disk space than the Cleanup function, although it takes more time to perform the operation.

The following examples illustrate the effect of the Cleanup and Minimize functions.



Note: *Executing the Minimize function requires a significant amount of free disk space. Its first priority is to destroy no data accidentally. The Minimize function makes a copy of the portion of the take that can be played back before it removes the original take. Therefore, if your disk is full of recordings, or even close to full, you may not be able to use the Minimize function.*

Note: *You should use the Minimize function as often as possible to remove unnecessary data from your hard disk.*

Note: *The Minimize function will not work on a take that has more than one portion that will be played back. The resulting operation would create multiple new takes, which is not allowed. In this case, the Minimize function must leave the original take as it was. See the third and fifth examples in the diagram above.*

To perform the Cleanup or Minimize procedure:

1) Press the SUB-MENU key.

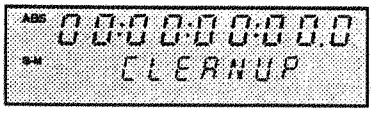
The indicator in the key will flash and the text SUB-MENU will appear on the display.

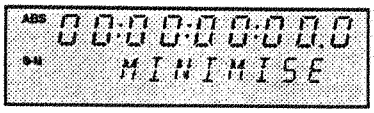
2) Press the 1(DISK) key - numeric keypad.

The message TIME will appear on the display.

3) Use the JOG/SHUTTLE control to select the Cleanup or Minimize function.

The message CLEANUP or MINIMISE will appear on the display.





4) **Press the STORE/ENT key.**
The message SCSI ID 0 will appear on the display.

5) **Use the JOG/SHUTTLE control to select a SCSI ID.**
The selected SCSI ID should correspond to that of the disk that you want to cleanup or minimize.

6) **Press the STORE/ENT key.**
The message SURE ?? will appear on the display.

7) **Press the STORE/ENT key again to start the operation.**
During the operation, the messages BUSY and COUNT will alternate on the display.

When the operation is complete, the message DONE will appear on the display. The previous mode will be restored.

Copying Disks and Projects

You can copy the entire contents of a hard disk, or a single project on the disk, to another disk connected to the SCSI-A bus.

> **Note:** *You should use a destination hard disk that is larger than your source disk. An error message appears if you try to copy data from a large capacity disk to a smaller disk, preventing the Copy function from being performed.*

Copying an entire disk

You can copy the entire contents of a hard disk to another disk.

> **Warning:** *The Disk Copy operation will erase all data on the destination disk. Before performing this operation, make sure that you have backed up important data from the destination disk.*

To copy an entire disk to another disk:

1) **Press the SUB-MENU key.**
The indicator in the key will flash and the text SUB-MENU will appear on the display.

2) **Press the 1 (DISK) key – numeric keypad.**
The message TIME will appear on the display.

3) **Use the JOG/SHUTTLE control to select the Copy function.**
You will see a display similar to the following:

4) Press the STORE/ENT key.

The message `ID0 -> ID0` will appear on the display. The first SCSI ID is the copy source, the second is the destination.

5) Rotate the JOG wheel to select the source SCSI ID.

6) Use the SHUTTLE control to move the cursor to the destination SCSI ID.

See "Cursor" on page 27.

7) Rotate the JOG wheel to select the destination SCSI ID.

> **Warning:** *Make certain you select the correct SCSI ID for both the source and destination disks. If you get the two mixed up, you could lose all your data.*

8) Press the STORE/ENT key.

The message `ENTIRE` will appear on the display.

9) Press the STORE/ENT key.

The message `SURE ??` will appear on the display.

If you change your mind, press the ESCAPE key to cancel the Copy operation.

10) Press the STORE/ENT key again to start copying.

As the DR16 copies the disk, the message `COPYING` will appear on the display.

When the copy function is complete, the message `DONE` will appear on the display. The previous mode will be restored.

> **Note:** *If you selected a source or destination SCSI ID that had no corresponding disk, an error message will appear on the display.*

Disk Copy Notes

You cannot playback recorded data on the DR16 if you have changed the disk SCSI ID. See "SCSI IDs" on page 111.

When the DR16 records data to a hard drive, it includes the SCSI ID in the data. If you copy data from one disk to another (for example, you copy data from disk ID 0 to disk ID 1) the data is copied with the destination disk SCSI ID (that is, the data is recorded as being from disk ID 1).

Copying a project

You can copy projects one by one from the current disk to another disk.

> **Note:** *No data will be erased from the destination disk by the Project Copy operation; new data will be added to the disk.*

> **Note:** *You cannot use the Copy Project function to duplicate a project on the same hard disk. To accomplish this, you must instead assign the project to a take, create a new project, and commit the take. See "Projects" on page 105.*

To copy a project to another disk:

1) **Follow steps 1) through 7) of the Disk Copy procedure.**
See "Copying an entire disk" on page 119.

2) **Press the STORE/ENT key.**
The message ENTIRE will appear on the display.

3) **Use the JOG wheel to select PROJECT.**

4) **Press the STORE/ENT key.**
The display will show the name of projects that exist on the copy source disk.

5) **Rotate the JOG wheel to select a project you wish to copy.**

6) **Press the STORE/ENT key.**
The message SURE ?? will appear on the display.
If you change your mind, press the ESCAPE key to cancel the Copy operation.

7) **Press the STORE/ENT key again to start copying.**
As the DR16 copies the project, the message COPYING will appear on the display.
When the copy function is complete, the message DONE will appear on the display. The previous mode will be restored.

> **Note:** *If you selected a source or destination SCSI ID that had no corresponding disk, an error message will appear on the display.*

Project Copy Notes:

If a project with the same name as the copied project exists on the destination disk, the DR16 will automatically add the suffix "_1" to the copied project name so that the new data will not overwrite the existing data on the destination disk. For example, if you are trying to copy project called "SESSION," and if a project with the same name already exists on the destination disk, the name of the copied project will become "SESSION_1."

While editing or using the Take function for a disk data created on the Akai DD1500, you may find multiple projects use the same take. When you copy such projects one by one using the Project Copy function, the associated take will be copied each time you copy the project. For example, if Project A and Project B share the same take of 30 minutes in duration, copying Project A and Project B one by one will also copy the same take twice, using a total of 60 minutes of the destination disk space.

Data Compatibility with the DD1500

The DR16 can read data from MO cartridges created on the Akai DD1500.

However, you will first need to expand the buffer memory size by installing optional memory board EXM1508 (8Mbyte) into memory slot (J6) on the DR16 CPU board.

- The maximum simultaneous recording tracks is four or less.
- The maximum simultaneous playback tracks is eight or less.

While four tracks are being recorded simultaneously, the DR16 cannot play back the other tracks. This restriction is due to the speed of the MO drive.

While eight tracks are being played back simultaneously, the sound may be interrupted if the data consists of numerous short takes. This is also due to the speed (access time) of the MO drive.

Operation procedure

This section explains how to set-up the DR16 to access an MO drive. Refer to the section on "Hard Disks" in this chapter for detailed information about SCSI devices and connections.

To access DD1500 data on an MO disk:

1) **Make sure that the power to the DR16 and the MO drive is off, and plug an appropriate SCSI cable into the SCSI-A connector on the rear panel of the DR16. Attach the other end to the corresponding connector on the MO drive (or DD1500x).**
Make sure the SCSI chain is properly terminated and the SCSI ID number of the MO drive is correctly set.

2) **Turn on the power to the MO drive first, then to the DR16.**

3) **Press the SUB-MENU key.**
The indicator in the key will flash and the text SUB-MENU will appear on the display.

4) **Press 4(UTILITY) key - numeric keypad.**
You will see the display LOAD PROJ.

5) **Press the STORE/ENT key.**
You will see the display SCSI ID 0.

6) **Use the JOG/SHUTTLE control to select the SCSI ID of the MO drive.**

7) **press the STORE/ENT key.**
If the MO disk contains data created on the DD1500, the name of the DD1500 project will appear. If it contains multiple projects, use the JOG/SHUTTLE control to select the desired project name.

8) Press the STORE/ENT key.

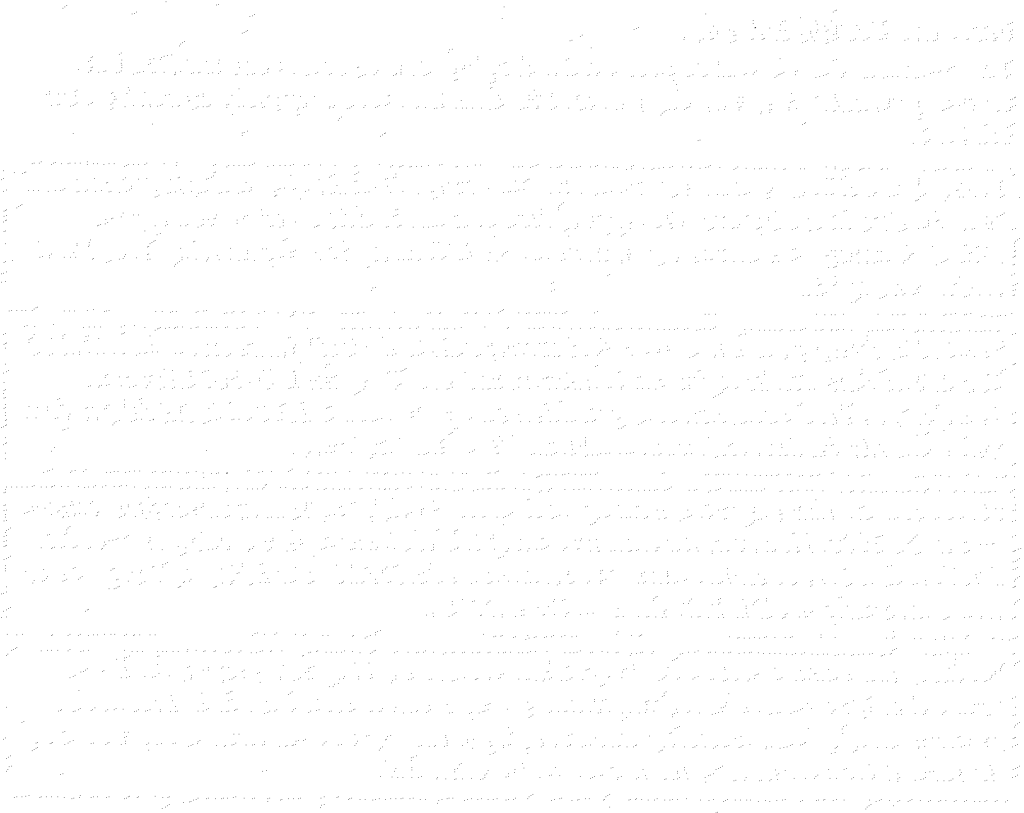
The message DONE will appear on the display. You can now use the DR16 to record, playback, and edit data on an MO disk that was originally created on the DD1500.

Note: *The DD1500 allows you to use the recordings (TAKEs) for multiple projects and save the data in the library. This type of data will not be deleted when you use the DR16's Cleanup or Minimize functions on the MO disk.* *See "Optimizing Your Hard Disks" on page 117.*

Note: *The Delete function on the DR16 corresponds to the CUT function on the DD1500. The deleted data will be registered to memory address "0" of the DD1500 Clipboard. Therefore, on the DR16, each time you delete data from the DD1500 disk, the deleted data will overwrite the data registered at address "0" of the Clipboard.*

Note: *You can also play back, back-up, and restore Q-lists (including stereo files) created on the DD1000. However, the back-up data of DD1000 stereo files created on the Akai DR8 version 1.41 or earlier cannot be restored on the DR16. The DR16 will play stereo cues converted from DD1000 disks on the DD1500.*

Note: *If you insert a second MO disk while you are working on a project, the DR16 senses that the disk has been changed and prompts you to reload the disk. This avoids problems in which the recording cannot be played back, or in which data is overwritten if the same project name happens to exist on the other disk.*



13 Backup and Restore

This chapter explains how to back up and restore material recorded on the DR16. You can back up to a DAT recorder with digital I/O.

Backup

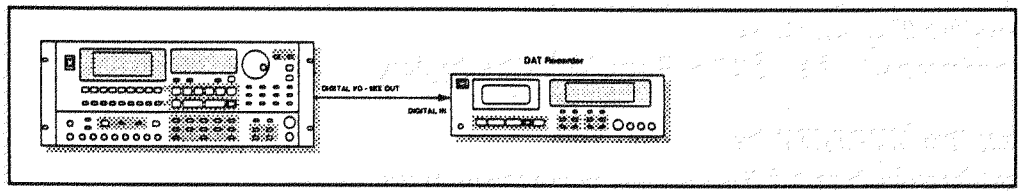
Backup to DAT

To use a DAT recorder for backup, it must have digital inputs and outputs. A professional DAT recorder equipped with XLR connectors is preferable.

> **Note:** *Before backing up to a DAT recorder, make sure that the volume controls on any equipment connected to the DAT recorder's outputs are turned fully down. The sound output by the DAT recorder during backup may damage your loud speakers.*

DAT Backup Connection

Plug a cable into the DIGITAL I/O - MASTER OUT connection (XLR-type or RCA jack). Fasten the other end to the appropriate connection on the DAT recorder:



You must set the DAT player to match the sampling frequency of the data you want to back up. Refer to the manual that came with your DAT recorder for the details of its operation.

Creating a Backup

Data on the internal hard disk will be backed up. You can select whether you back-up all the data or an individual project on the hard disk.

1) **Press the SUB-MENU key.**
The indicator in the key will flash and the text SUB-MENU will appear on the display.

2) **Press the 1(DISK) key - numeric keypad.**
The message TIME will appear on the display.

3) **Use the JOG/SHUTTLE control to select the Backup function.**
You will see a display similar to the following:

4) Press the STORE/ENT key.
The message ENTIRE 0 or PROJECT 0 will appear on the display.

To backup the entire disk to DAT tape:

5) Use the JOG/SHUTTLE control to select ENTIRE mode and the SCSI ID number of the disk you want to back up and proceed to Step 8) below.
Select "0" to backup the internal hard disk.

To backup a project from the disk to DAT tape:

5) Use the JOG/SHUTTLE control to select PROJECT mode and the ID number of the disk you want to back up.
Select "0" to backup the internal hard disk.

6) Press the STORE/ENT key.
The display will show the name of the first project on the hard disk.

7) Use the JOG wheel to select the project you wish to back up.

8) Press the STORE/ENT key.
The message TYPE DAT will appear on the display.

9) Press the STORE/ENT key.
A message such as LENGTH 30 will appear on the display.

This mode allows you to indicate the duration of the DAT tape you intend to use.

10) Use the JOG/SHUTTLE control to select the duration of the DAT tape.
You can select from 30, 45, 60, 90, 120, or 180 minutes.

> **Note:** *The display time is approximate. The actual back up time will be slightly different. The DR16 cannot perform the backup if the time is greater than 3 hours (maximum DAT tape length is 180 minutes). In this case, you must use the edit functions to remove any unnecessary sections (see "Editing" on page 91) and then use the cleanup/minimize function to reduce the data (see "Optimizing Your Hard Disks" on page 117).*

11) Press the STORE/ENT key.
You will see the display READY ??. If you are ready, start recording on the DAT recorder.

12) Press the STORE/ENT key again to execute the back-up operation.
During the back-up operation, the display shows the BUSY message. This message changes to DONE when the operation is complete.

The DR16 returns to normal mode.

To back-up data to multiple tapes:
If one DAT tape cannot accommodate the data on the hard disk, the DR16 will temporarily stop the backup operation near the end of the tape and display the message NEW TAPE.

13) Stop the DAT recorder and replace the tape.

14) Press the STORE/ENT key on the DR16.
The message length LENGTH again appears on the display.

15) Select the duration of the new tape. Then resume recording on the DAT recorder.

16) Press the STORE/ENT key.
The DR16 displays BUSY and resumes the backup operation. This message changes to DONE when the operation is complete.

The DR16 returns to normal mode.

Note: *You cannot back up one continuous long recording (longer than the length of the tape) over multiple tapes. (The display will show BAT-ERROR.)*

Note: *It is possible to use a 180 minute DAT tape. However, a 180 minute tape is thinner and may cause recording data to drop out, which lowers the reliability and the integrity of the recorded data.*

Aborting the Backup Function

If at any time during the back up function you want to cancel this procedure, press the ESCAPE key. The message ABORT will appear on the display. Press any key to continue.

Warning: *DO NOT attempt to load an incomplete backup. This could result in the loss of ALL of your data.*

Warning: *The DR16 cannot verify the condition or capability of a connected DAT recorder. Therefore, AKAI cannot guarantee the quality or reliability of your backups.*

Restore

Before you restore your backup to the hard disk, you must delete all the data from the disk by using the format function (see "Formatting Disks" on page 115). Backup any data that you want to keep before you do this (see"Backup" on page 125).

Note: *The restore function is available only for the entire disk. You cannot restore individual projects. If you have backed up individual projects to multiple tapes in Project mode (see "Backup to DAT" on page 125), you cannot restore them to the same disk.*

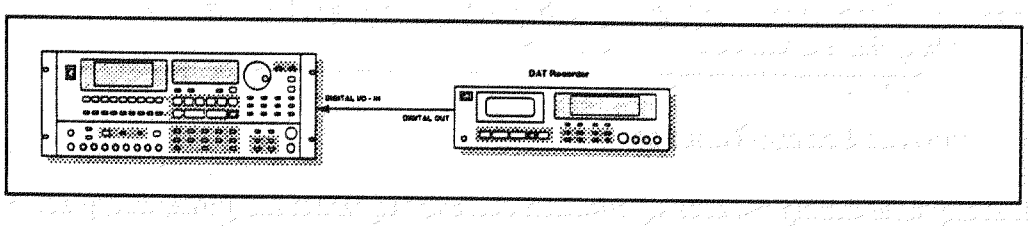
Loading from DAT

Insert your write-protected backup tape into the DAT recorder and set it up for playback.

Note: *Before loading from a DAT recorder, make sure that the volume controls on any equipment connected to the DAT recorder's outputs are turned fully down. Otherwise, the sound output by the DAT recorder while loading may damage your loudspeakers.*

DAT Loading Connection

Plug a cable into the DIGITAL I/O - IN connection. Fasten the other end to the appropriate connection on the DAT recorder:

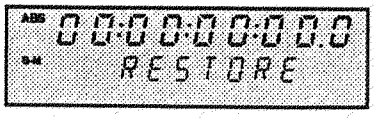


Restoring the Backup

1) **Press the SUB-MENU key.**
The indicator in the key will flash and the text SUB-MENU will appear on the display.

2) **Press the 1(DISK) key - numeric keypad.**
The message TIME will appear on the display.

3) **Use the JOG control to select the Restore function.**
You will see a display similar to the following:



4) **Press the STORE/ENT key.**
The message RESTORE 0 will appear on the display.

5) Select the hard disk SCSI ID number using the JOG/SHUTTLE control.
This is the disk to which you are going to restore data. Select "0" for the internal hard disk.

6) Press the STORE/ENT key.
The display will show the current digital connector.

7) Use the JOG wheel to select a digital connector.

Connector	Display
XLR	DIGI.n XLR
RCA/phono	DIGI.n RCA

8) Press the STORE/ENT key.
The message SURE ?? will flash on the display.

9) Press the STORE/ENT key.
The new connector will be selected.

10) If everything is set correctly, press the STORE/ENT key.
The DR16 will display the message START TAPE.

11) Start playback on the DAT recorder.
When the DR16 receives the data, it starts loading data and the display shows the message BUSY. The message changes momentarily to DONE when the operation is complete, then the DR16 returns to normal mode.

To load from multiple tapes:

If the data has been backed up on multiple tapes, the DR16 will display NEXT TAPE when the loading of data from the first tape is complete.

12) Replace the tape and resume playback on the DAT.
The DR16 automatically resumes the loading operation when it receives data from the tape. The display shows the message BUSY. The message changes momentarily to DONE when the operation is complete, then the DR16 returns to normal mode.

> **Note:** *To load data stored on multiple tapes, be sure to insert the DAT tapes in the same sequence as during the backup operation.*

Restore Notes

If at any time during the restore function you want to cancel this procedure, press the ESCAPE key. The message ABORT will appear on the display. Press any key to continue.

14 Synchronization

This chapter explains how to synchronize the DR16 to additional, multiple DR16s, DR8s, or various other devices. The following connections and optional boards are available:

- Remote connection for multiple DR16/DR8 operation
- Optional IB-802T SMPTE reader/generator board for SMTPE/EBU timecode master/slave operation
- Optional IB-803M MIDI interface board for MIDI timecode (MTC), MIDI clock (SPP), or MIDI machine control (MMC) synchronization
- Optional IB-806B Bi-Phase board for Bi-Phase synchronization
- Optional IB-805R RS422 interface board for master/slave operation via RS422

Multiple DR16/DR8 Operation

The multi-DR16 function allows you to run up to seven slave DR16s or DR8s in synchronization by connecting them using remote cables. You can control all functions from a single master DR16, except for those functions related to tracks (such as recording, playback, and mixing).

From the slave units, you can carry out the track-related functions (selecting the record/playback track, and setting the mixer) and the recording operations (the Take function, etc.).

Operations that you cannot control from the slave units include those related to time (i.e., play, stop, locate, jog, etc.), those related to playing (rehearsal, repeat, etc.), and some complex operations such as editing. These operations can be controlled from the master machine.

Connection

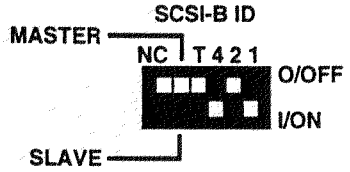
To connect the DR16s/DR8s to each other, plug remote AL-X50 cables into one of the three remote connectors. (There is one REMOTE connector on the front panel, and one REMOTE connector and one THRU connector on the rear panel.) You may use any of these connectors since they are directly connected internally.

System Set up

Before turning on the power to the DR16s/DR8s, you need to first set the dip switch on the rear panel of each DR16/DR8 to a unique ID number.

This ID number setting is also used to set the SCSI-B ID number when connecting the DR16 to a personal computer.

The rear panel of the DR16 includes a set of dip switches.



The three switches on the right — labelled 4, 2, and 1 — are used in conjunction to select a unique ID number. The numbers of the switches you press down to the ON position are added to together to create a unique ID number. For example, if you wish to select SCSI ID 1, press down only the far right switch. If you wish to select SCSI ID 2, press down only the switch that is second from the right. To select SCSI ID 5, press down switches 1 and 4 (as illustrated on page 131); to select SCSI ID 3, press down switches 1 and 2, and so on.

Also, set the second dip switch from the left on the master DR16 to MASTER (the up position). Set this switch on all slave DR16s or DR8s to SLAVE (the down position).

Now, you are ready to turn on the power first to the slave units, then to the master unit. See "To synchronize multiple DR16s/DR8s:" on page 132.

To synchronize multiple DR16s/DR8s:

1) Turn the power to the slave DR16s/DR8s.

After the machines perform a disk scan, the display on the slave machines will show `SLAVE-`.

Confirm that the display on each slave machine shows this indication.

2) Turn on the power to the master DR16.

After performing a disk scan, the display on the master DR16 will show `MASTER`, and the slave machines will show a different number such as `SLAVE1`, `SLAVE2`, etc.

All the equipment is now ready to use.

3) Press the SYNC key on the slave units that you wish to synchronize with the master DR16.

This will prepare them for sync operation.

(If at some point you wish to operate a slave machine as a stand-alone unit, turn its SYNC key OFF.)

Note: *The slave number on the slave machine will not necessarily match the dip switch setting. If you wish to check the slave number, press the SYNC key in SUB-MENU mode, select REMOTE, and press the STORE/ENT key.*

Note: *If a slave machine does not display the correct indication, or if the same slave number is displayed on two or more machines when the master DR16 is ready for use, check the dip switch setting. The machines may sometimes appear to operate correctly even if the same ID number is used on two or more DR16s. Therefore, first make sure that a unique ID number is assigned to each DR16.*

SMPTE/EBU Synchronization

SMPTE/EBU timecode is an industry standard developed to allow synchronization between two film or video devices. It has since been adopted by the audio industry, initially to enable audio-to-video synchronization, and subsequently to allow for the synchronization of several different devices.

IB-802T SMPTE Reader/Generator Board

To use SMPTE/EBU synchronization, you must install the optional IB-802T SMPTE reader/generator board. Please contact your Akai professional dealer for details.

Connection and Setup

Follow the steps below to setup the SMPTE/EBU system.

> **Note:** *If you try to set parameters related to the SMPTE/EBU synchronization without an IB-802T board installed, the message* `NO OPTION` *will appear on the display.*

To setup the system:

1) Use SMPTE/EBU timecode cables to connect the SMPTE IN jack of the IB-802T SMPTE reader/generator board on the DR16 to the appropriate connector on the external device.

For timecode output, connect a cable to the SMPTE OUT jack.

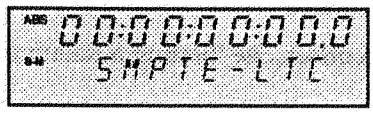
> **Note:** *Depending on the external device supplying the timecode, you may need to use an adapter cable such as an XLR type-to-stereo phone plug.*

2) Press the SUB-MENU key.

The indicator in the key will flash and the text `SUB-MENU` will appear on the display.

3) Press the SYNC(SYNC) key.

You will see a display similar to the following:



4) Use the JOG/SHUTTLE control to select the type of sync mode.

Sync Mode	Display
SMPTE/EBU	`SMPTE-LTC`
MIDI Clock	`MIDI-SPP`
MIDI Timecode	`MIDI-MTC`
MIDI Machine Control	`MIDI-MMC`
Remote	`REMOTE`

In this case, select `SMPTE-LTC` to use SMPTE/EBU synchronization.

5) **Press the STORE/ENT key to store your choice.**

6) **Use the JOG/SHUTTLE control to select the mode status.**
Select OFF, MASTER, or SLAVE. The default is OFF. If you select the default, the DR16 returns to the previous mode.

7) **Press the STORE/ENT key.**
The display will show the current timecode type.

8) **Use the JOG/SHUTTLE control to select a timecode type.**

Timecode Type	Display
24 frames/sec	SMPTE 24F
25 frames/sec	EBU 25F
30 frames/sec	SMPTE 30F
30 drop frames/sec	SMPTE 30D
29.97 frames/sec	SMPTE29.97
29.97 drop frames/sec	SMPTE29.97D

9) **Press the STORE/ENT key to store your choice.**

SMPTE-LTC Slave Synchronization

1) **Press the SYNC key to turn on the synchronization function.**
The green LED beside the key will light.

2) **Press the Play ▷ key.**
The DR16 will locate to the external timecode position immediately and synchronization will start.

Synchronization with an Offset

During SMPTE-LTC slave synchronization, the DR16 synchronizes to the received timecode and that time value is displayed. Using the relative time display allows timecode-synchronized operation with an offset.

When required, stop the DR16, then set an offset. See "Setting a Relative Time Offset" on page 88.

> **Note:** *If the timecode signal is interrupted during SMPTE-LTC slave synchronization, the DR16 will stop playback until the signal is again received.*

SMPTE-LTC Master Synchronization

1) Press the SYNC key to turn on the synchronization function.
The green LED beside the key will light.

> **Note:** *If the SYNC key is OFF, the DR16 will not output the timecode.*

2) Press the Play ▷ key, or the Play ▷ and REC ● keys simultaneously.
During playback or recording, the DR16 will output the selected SMPTE/EBU timecode from the SMPTE OUT jack of the IB-802T SMPTE reader/generator board.

Output level: 4.0V peak to peak - unbalanced.

Master Synchronization Notes

Although the Fast Forward and Rewind keys will function correctly during synchronization to SMPTE/EBU timecode, the timecode information is not transmitted. Therefore, connected external devices are stopped during these operations.

If the timecode signal is interrupted during SMPTE-LTC master synchronization, the slave units will stop playback until the signal is again received.

If the SMPTE/EBU timecode synchronization operation continues over 24:00 absolute time (midnight), the sound data will be momentarily interrupted.

MIDI Synchronization

The DR16 can function as a clock master to synchronize external MIDI devices, such as a sequencer. The DR16 can use MIDI timecode (MTC), MIDI Machine Control (MMC), and MIDI Clock (SPP) signals. You can also use MMC software to control the DR16 externally.

IB-803M MIDI Interface Board

To use MIDI synchronization, you must install the optional IB-803M MIDI interface board. Please contact your Akai professional dealer for details.

Connection and Setup

Follow the steps below to setup the MIDI synchronization system.

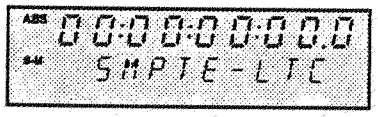
> **Note:** *If you try to set parameters related to MIDI synchronization without an IB-803M board installed, the message* `NO OPTION` *will appear on the display.*

To setup the system:

1) **Using MIDI cables, connect the MIDI OUT and MIDI IN terminals of the IB-803M MIDI interface board on the DR16 to the appropriate MIDI IN and MIDI OUT terminals on the external MIDI device.**

2) **Press the SUB-MENU key.**
The indicator in the key will flash and the text `SUB-MENU` will appear on the display.

3) **Press the SYNC(SYNC) key.**
You will see a display similar to the following:



4) **Use the JOG/SHUTTLE control to select a sync mode.**

Sync Mode	Display
SMPTE/EBU	`SMPTE-LTC`
MIDI Clock	`MIDI-SPP`
MIDI Timecode	`MIDI-MTC`
MIDI Machine Control	`MIDI-MMC`
Remote	`REMOTE`

In this case, select `MIDI-SPP`, `MIDI-MTC`, or `MIDI-MMC`.

5) **Press the STORE/ENT key to store your choice.**

6) **Use the JOG/SHUTTLE control to select the status of the sync mode.**
Select from the following available options:

- MIDI-MTC: OFF, MASTER
- MIDI-SPP: OFF, MASTER
- MIDI-MMC: OFF, SLAVE

The default is OFF for MIDI-MTC and MIDI-SPP; the default is SLAVE for MIDI-MMC. If you select the default, the DR16 returns to the previous mode.

7) **Press the STORE/ENT key to store your choice.**

8) **If you selected `MIDI-MTC`, use the JOG/SHUTTLE control to select the timecode type.**

Timecode Type	Display
24 frames/sec	`SMPTE 24F`
25 frames/sec	`EBU 25F`
30 frames/sec	`SMPTE 30F`
30 drop frames/sec	`SMPTE 30D`
29.97 frames/sec	`SMPTE29.97`
29.97 drop frames/sec	`SMPTE29.97D`

9) **Press the STORE/ENT key.**
The DR16 will store the selected synchronization mode and status.

MIDI Timecode Synchronization

1) **Press the SYNC key to turn on the synchronization function.**
The green LED beside the key will light.

2) **Press the Play ▷ key or the Play ▷ and REC ◻ keys simultaneously.**
During playback or recording, the DR16 will output a MIDI timecode signal corresponding to the selected SMPTE/EBU timecode type from the MIDI OUT terminal of the IB-803M MIDI interface board.

MIDI Clock Synchronization

1) **Press the SYNC key to turn on the synchronization function.**
The green LED beside the key will light.

2) **Press the Play ▷ key or the Play ▷ and REC ◻ keys simultaneously.**
During playback or recording, the DR16 will output a MIDI clock signal corresponding to the programmed Tempo Map (see "Creating a Tempo Map" on page 144) from the MIDI OUT terminal of the IB-803M MIDI interface board.

MIDI Synchronization Notes

Although the Fast Forward and Rewind keys will function correctly during synchronization to MIDI, the MIDI timecode information and MIDI clock commands are not transmitted. Therefore, the connected external devices are stopped during these operations.

If you operate the DR16 Play and Stop keys or a connected footswitch (Play → Stop → Play → Stop → Play) very quickly during MIDI clock synchronization, the external MIDI device may not be able to respond quickly enough and the playback sound may slip.

If you use varispeed playback during MIDI timecode or clock synchronization, the external MIDI device may not be able to respond quickly enough and the playback sound may slip.

If you use high-varispeed playback during MIDI timecode or clock synchronization, the DR16 may stop outputting MIDI timecode or clock, resulting in failed synchronization.

About MIDI Machine Control

The MIDI Exclusive Command and MIDI machine Control specifications of the DR16 conform to the MIDI Machine Control RP (Recommended Practice) Version 1.00. This allows you to control the DR16 using the MMC protocol. Connect an external controller to the MIDI IN and MIDI OUT terminals of the IB-803M MIDI interface board installed in your DR16.

MMC commands can be sent to the DR16 at anytime.

All external MMC controllers must have an ID number that should match the ID setting on the DR16. However, if a controller is set to generate a BROADCAST ID (ID number 127), any ID number can be set on the DR16.

Bi-Phase Synchronization

IB-806B Bi-Phase Interface Board

To use bi-phase synchronization, you must install an optional IB-806B Bi-Phase interface board. Please contact your Akai professional dealer for details.

Master/Slave Operation Via RS422

IB-805R RS422 Interface Board

To use RS422 master/slave operation, you must install an optional IB-805R RS422 interface board. Please contact your Akai professional dealer for details.

15 Song Mode

This chapter explains how to create songs, beat maps, and tempo maps on the DR16 using the Song Mode functions. These functions are used when synchronizing the DR16 to an external sequencer via MIDI. See "MIDI Synchronization" on page 136.

Note: *To use MIDI synchronization, you must install an optional IB-803M MIDI interface board. Please contact your Akai professional dealer for details.*

Tempo Map

When you use the DR16 as a MIDI master, the tempo of the connected MIDI slave sequencer is determined by the rate of the MIDI clock. Therefore, you must first create a tempo map on the DR16, so that the sequencer plays at the correct tempo.

If a song's tempo remains the same throughout, the tempo map will have only one entry. That entry will be at the beginning of the song and will specify the song's tempo. If the song contains any tempo changes, these changes will have to be entered into the tempo map.

Initially, the first entry in the tempo map is set to 120 bpm.

Beat Map

As well as setting the tempo, you must also specify the song's beat (time signature). For example, if the DR16 counts in 4/4 time while the sequencer plays in 3/4, one beat per bar will slip.

Just like tempo, if a song's beat remains the same throughout, you only have to specify it once at the beginning of the song. However, if the beat of the song changes, these changes will have to be entered into the beat map.

Initially, the first entry in the beat map is set to 4/4.

Tempo and Beat Map

Before creating a tempo or beat map, it's a good idea to jot them down on paper first. This way you'll also have a hard copy for quick reference. The following tables show how you could layout a beat map and tempo map.

Example Beat Map

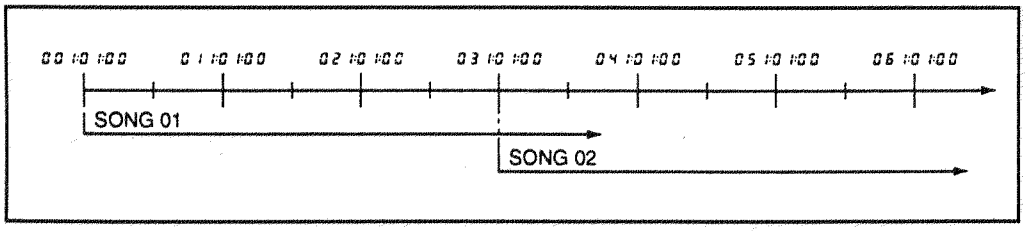
Step	Beat	Bar No.
01 (initial)	4/4	0
02	3/4	9
03	4/4	17
04		

Example Tempo Map

Step	Tempo	Bar No.
001 (initial)	120	0
002	122	9
003	120	17
004		

Song

A song contains various data, such as a tempo map, a beat map, and the start point. You can create multiple songs on the DR16. However, because all the songs will exist on the same time axis, you need to leave enough time between them. For example, assume that Song 01 starts at 00 :0 :00 (0 minute - Absolute time), and Song 02 starts at 03 :0 :00 (1 minute - Absolute time). If the length of Song 01 exceeds one minute, part of it will overlap the beginning of Song 02. You may want to set the start time of Song 02 at 1 hour - Absolute time to allow enough time between the songs.



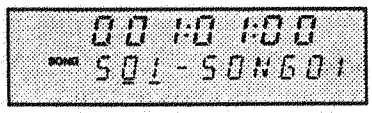
Creating a Song

Selecting a song

To select a song, follow the steps below:

To select a song:

1) **Press the SONG key.**
The green LED beside the key will light up. The word SONG will appear on the display, indicating that the DR16 is in Song mode. The display will also show a song number and title, similar to the following:



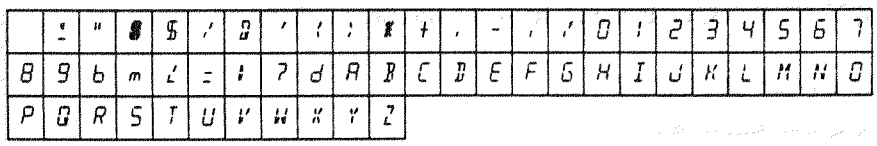
2) **Use the JOG/SHUTTLE control to select a song number.**
You can select from song S01 to song S10.

Name the song

You can give the song a name consisting of up to six characters.

1) **Rotate the SHUTTLE control to move the cursor to the first character in the song name.**
See "Cursor" on page 27.

2) **Rotate the JOG wheel to select a character.**
Select a character from the following character set:



3) **Repeat the above procedure until you have completed the name.**
If you do not want to change the name, you can omit the above steps.

4) **Press the STORE/ENT key to store the name.**
The cursor must be on the song name.

Setting the song start time

The default song start time is relative time 0.

If you want to start a song at a specific time, you must locate to the desired time. See "Locate Functions" on page 81. Once you have located to the start time, press the RESET key. The time display shows 00 1:0 1:00. This is a Relative time setting.

You can also set a value using the Absolute/Relative time display. See "Setting Relative Time to Zero" on page 88.

Tip: *To see the Absolute/Relative time display when the DR16 is in Song Mode, press the TIME D key.*

In order to operate the DR16 in offset sync with an external device, fine tune the start point to set the offset amount. See "Setting a Relative Time Offset" on page 88.

Setting the Beat

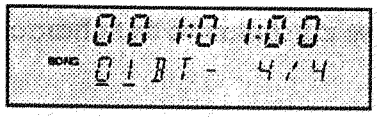
Note: As a default setting, 01 BT - 4/4 is set to Absolute Time 00:00:00:00.0.

To set the beat and create a Beat map:

1) **Press the SONG key to enter Song mode.**
The green LED beside the key will light and the word SONG will appear on the display. The display will also show a song number and title.

2) **Press the BEAT key.**
The green LED beside the key will light.

The display shows the following screen, indicating that the time signature of the first beat point (step) - default setting - is set to 4/4.



3) **Use the JOG/SHUTTLE control to set the initial beat.**
The beat can be set from 1/4 time to 32/32 time.

For this example, let's assume that you have set the Beat to 4/4.

4) **Press the STORE/ENT key.**
Beat 4/4 is set as the initial beat.

5) **Locate the next point (time) at which you wish to enter the beat data.**

This example indicates that you have located the third bar, and a Beat of 4/4 was set before the current point.

6) **Use the JOG/SHUTTLE control to specify a new beat.**
This time, let's assume that you have set the Beat to 3/4.

7) **Press the STORE/ENT key.**
A beat of 3/4 will be stored at the specified point.

8) **Repeat Steps 5, 6, and 7 to create a Beat map.**

> **Note:** *You can set the beat for each bar, but the smallest resolution is one bar. If you set the beat in the middle of a bar, the change will be entered at the beginning of the bar.*

9) **Press the BEAT key to cancel the beat function.**

To check the Beat map:

1) **Press the BEAT key in Song mode.**
The green LED beside the key will light.

2) **Rotate the JOG wheel.**
The step numbers will change and you can check the step, time, and beat settings.

3) **Press the BEAT key again to cancel the beat function.**

Deleting Entries from the Beat Map

To delete an entry from the beat map:

1) **Press the BEAT key in Song mode.**

2) **Rotate the JOG/SHUTTLE control to select a step number you wish to delete.**

3) **Press the REC ⏺ key.**
The map entry will be deleted and the subsequent step numbers will be updated.

4) **Press the BEAT key again to cancel the beat function.**

> **Note:** *You cannot delete the initial beat setting Step number 01.*

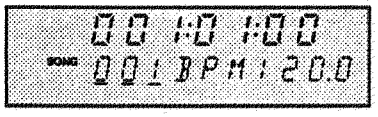
Creating a Tempo Map

You must create a Beat map before creating a Tempo map.

To create a Tempo map:

1) **Press the TEMPO key in Song mode.**
The green LED beside the key will light.

The following screen appears on the display, indicating that the tempo of the first beat point (step) - default setting - is set to 120.0.



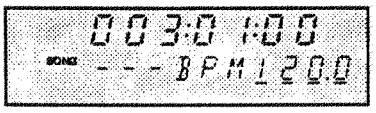
2) **Rotate the SHUTTLE control to access the tempo indication.**

3) **Rotate the JOG wheel to set the initial tempo.**
The tempo can be set from 30 to 300 bpm.

For this example, let's assume that you have set the Tempo to 120.0.

4) **Press the STORE/ENT key.**
Tempo 120.0 is set as the initial tempo.

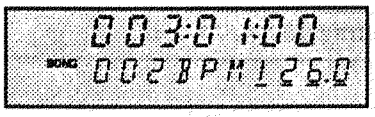
5) **Locate the point at which you wish to enter the tempo data.**



This example indicates that you have located the third bar, and a Tempo of 120.0 was set before the current point.

6) **Rotate the JOG wheel to select a new tempo.**
For this example, let's assume that you entered a tempo of 126.

7) **Press the STORE/ENT key, and Tempo 126 will be stored at the specified point.**



8) **Repeat Steps 5 and 6 to create a Tempo map.**

> **Note:** *The resolution for the tempo map is much finer than the beat map. You can set a tempo change for each clock.*

9) **Press the TEMPO key again to cancel the tempo function.**

To check the Tempo map:

1) **Press the TEMPO key in Song mode.**

2) **Rotate the JOG wheel.**
The step numbers change and you can check the step, time, and tempo.

3) **Press the TEMPO key again to cancel the tempo function.**

Deleting Entries from the Tempo Map

To delete an entry from the Tempo map:

1) **Press the Tempo key in Song mode.**

2) **Rotate the JOG wheel to select a step number for which you wish to delete the tempo.**

3) **Press the REC ⏺ key.**
The map entry will be deleted and the subsequent step numbers will be updated.

4) **Press the TEMPO key again to cancel the tempo function.**

Note: *You cannot delete the initial tempo setting Step number 01.*

16 Other Functions

System Set up

These functions allow you to adjust the display brightness, drop the sub-frame notation, assign MIDI controller numbers, and set up for mixing tab unit MT8.

Adjusting the Display Brightness

This function adjusts the brightness of the Peak Level meters and the Time and Status display.

1) **Press the SUB-MENU key.**
The indicator in the key will flash and the text SUB-MENU will appear on the display.

2) **Press the 3(SET UP) key - numeric keypad.**
You will see a display similar to the following:

3) **Press the STORE/ENT key.**
A message such as BRIGHT 4 will appear on the display.

4) **Use the JOG/SHUTTLE control to adjust the brightness.**
The range is 0 (dim) to 7 (bright). The default value is 5.

Changing the Time Display Notation

By default, the DR16 displays the sub-frame number when the time display is absolute or relative time (see "Time Display" on page 87). This function allows you to turn that extra digit off.

1) **Press the SUB-MENU key.**
The indicator in the key will flash and the text SUB-MENU will appear on the display.

2) **Press the 3(SET UP) key - numeric keypad.**

3) **Use the JOG/SHUTTLE control to select the Display function.**
You will see a display similar to the following:

4) Press the STORE/ENT key.
The message SUBFRM ON will appear on the display.

5) Use the JOG/SHUTTLE control to change the value.
The default is to display the sub-frame notation. After you change the value, you will see a display similar to the following:

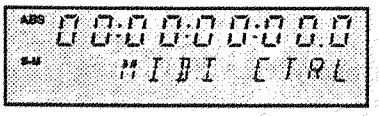
Note the absence of the decimal digit.

Assigning the MIDI Controllers

1) Press the SUB-MENU key.
The indicator in the key will flash and the text SUB-MENU will appear on the display.

2) Press the 3(SET UP) key – numeric keypad.

3) Use the JOG/SHUTTLE control to select the MIDI Controller functions.
You will see a display similar to the following:



4) Press the STORE/ENT key to enter the MIDI Controller functions.

> **Note:** *If you have not installed an optional IB-803M MIDI Interface board, message* NO OPTION will appear on the display.

Setting the Mute Controller

1) Rotate the SHUTTLE control to move the cursor to the data item.
The mute controller data will be underlined: MUTE nOFF. See "Cursor" on page 27.

2) Rotate the JOG wheel to select a controller number.
The range is OFF or controller number 000 to 127. The default is OFF.

Setting the Level Controller

1) Rotate the JOG wheel to select the Level Controller function.

2) Rotate the SHUTTLE control to move the cursor to the data item.
The level controller data will be underlined: LEVEL n007.

3) **Rotate the JOG wheel to select a controller number.**
The range is OFF or controller number 000 to 127. The default is 007.

> **Note:** *MIDI controller number 7 is by convention the main volume controller.*

Setting the Pan Controller

1) **Rotate the JOG wheel to select the Pan Controller function.**

2) **Rotate the SHUTTLE control to move the cursor to the data item.**
The pan controller data will be underlined: PAN ∩010.

3) **Rotate the JOG wheel to select a controller number.**
The range is OFF or controller number 000 to 127. The default is 010.

> **Note:** *MIDI controller number 10 (A_{16} [hexadecimal]) is by convention the pan controller.*

Setting the Send Level Controllers

The DR16 has two effect send channels, SEND1 and SEND2. You can set a controller for each channel.

1) **Rotate the JOG wheel to select one of the Send Level Controller functions.**

2) **Rotate the SHUTTLE control to move the cursor to the data item.**
The send level controller data will be underlined: SEND1 ∩OFF. This example shows the "SEND1" controller function.

3) **Rotate the JOG wheel to select a controller number.**
The range is OFF or controller number 000 to 127. The default is OFF for both send channels.

Setting the Bus Controller

1) **Rotate the JOG wheel to select the Bus Controller function.**

2) **Rotate the SHUTTLE control to move the cursor to the data item.**
The bus controller data will be underlined: BUS ∩OFF.

3) **Rotate the JOG wheel to select a controller number.**
The range is OFF or controller number 000 to 127. The default is OFF.

Setting the Master Controller

1) **Rotate the JOG wheel to select the "MASTR" (Master) Controller function.**

2) **Rotate the SHUTTLE control to move the cursor to the data item.**
The master controller data will be underlined: MASTR ∩OFF.

3) **Rotate the JOG wheel to select a controller number.**
The range is OFF or controller number 000 to 127. The default is OFF.

Setting the Fade Controller

1) **Rotate the JOG wheel to select the "FADE" Controller function.**
The message FADE OFF will appear on the display.

2) **Rotate the SHUTTLE control to move the cursor to the data item.**
The data item will be underlined on the display.

3) **Rotate the JOG wheel to select a controller number.**
The range is OFF or controller number 000 to 127. The default is OFF.

Setting the Mixer Snapshot MIDI Channel

1) **Rotate the JOG wheel to select the "PC-SNAP" (MIDI Channel) function.**

2) **Rotate the SHUTTLE control to move the cursor to the data item.**
The MIDI channel data will be underlined: PC-SNAP OFF.

3) **Rotate the JOG wheel to select a MIDI channel.**
The range is OFF, channel number 01 to 16, or OM (Omni). The default is OFF.

Setting the Device ID

1) **Rotate the JOG wheel to select the "DEV-ID" (Device ID) function.**

2) **Rotate the SHUTTLE control to move the cursor to the data item.**
The data will be underlined: DEV-ID 00.

3) **Rotate the JOG wheel to select the Device ID.**
The range is 00_{16} (hexadecimal) to $7E_{16}$. The default is 00_{16}.

Setting up for using a mixing tab unit MT8

You can control the DR16 from a connected mixing tab MT8 for the mixing function.

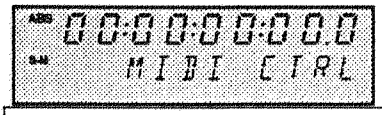
To use the MT8:

1) **Refer to the user's manual that came with the MT8 and connect it to the DR16.**

2) **On the DR16, press the SUB-MENU key.**
The indicator in the key will flash and the text SUB-MENU will appear on the display.

3) Press the 3(SET UP) key - numeric keypad.

4) Use the JOG/SHUTTLE control to select the MT8 Control functions.
You will see a display similar to the following:



Note: *If you have not connected the MT8 to the DR16 correctly, you will not see this display. In this case, refer to the MT8 user's manual and check the connections.*

5) Press the STORE/ENT key to enter the MT8 Control functions.

6) Rotate the JOG/SHUTTLE controls to select a parameter you wish to set up (SEND1, SEND2, PAN) and select a mode (ABS, REL) according to your applications.

Note: *Refer to the MT8 user's manual for more details about the parameters.*

SCMS

Pronounced "scums," SCMS (Serial Copy Management System) is a protection system designed to stop multiple digital copying of copyrighted material. SCMS applies to all CD players and consumer type DAT, MD, and DCC recorders. Basically, it prevents second-generation digital copies from being made. It has no effect when analog connections are used.

When the DR16 receives a digital signal that contains SCMS, it will not prevent the DR16 from recording. The digital signal will be recorded without the SCMS.

If you are recording material that is protected by copyright from any source, you must have the permission of the copyright owner before you use it.

There are no restrictions on the use of copyright-free material.

Akai cannot accept any responsibility for breach of copyright law.

Appendix

Specifications

Digital Audio Format	16-bit linear PCM			
Simultaneous Recording	16 tracks			
Audio Frequency Response	20 ~ 22 kHz ±1.0 dB (FS @ 48 kHz)			
A/D Conversion	18-bit 64-times oversampling 5th ΔΣ modulation			
D/A Conversion	Advanced 1 bit, 18-bit 8-times oversampling (analog out 1-12) Advanced 1 bit, 20-bit 8-times oversampling (analog out 13-16)			
Dynamic Range	Greater than 96 dB			
Distortion	Less than 0.05% (1 kHz, full scale –15 dB)			
Channel Crosstalk	Greater than 90 dB (1 kHz, FS @ 48 kHz)			
Wow & Flutter	Immeasurable			
Recording Media	Optional internal or external hard disk. Model DR16HD is shipped with an internal hard drive.			
Sampling Rates	48 kHz, 44.1 kHz, 44.056 kHz, 32 kHz			
Recording Time - 1 GB hard disk (total recording time)	FS @ 48 kHz	3 hours 1 minute (approx.)		
	FS @ 44.1 kHz/44.056 kHz	3 hours 17 minutes (approx.)		
	FS @ 32 kHz	4 hours 32 minutes (approx.)		
Display	Custom FLD - 7-segment Time display, 14-segment Message display, plus indicators			
Peak Level Meter	20-segment FLD bars (Channels 1 ~ 16, or SEND 1/2, BUS L/R, MASTER L/R)			
Analog Inputs x8	6.3 Ømm Stereo phone jack (Balanced/unbalanced connection)			
	Input gain switch	HIGH	MID	LOW
	Nominal input	-36 dBu	-16 dBu	+4 dBu
	Maximum input	-20 dBu	0 dBu	+20 dBu
	Impedance	52 kΩ		
Analog Outputs x16 or Analog Master Output (LxR) Aux Send x2	6.3 Ømm Stereo phone jack (Balanced/unbalanced connection)			
	Output gain switch	HIGH	LOW	
	Nominal output	+4 dBu	-10 dBu	
	Maximum output	+18 dBu	+4 dBu	
	Impedance	300 Ω		
	0 dBu = 0.775 Vrms, Load impedance:	600 Ω balanced, 47 kΩ unbalanced		
Digital I/O-A (EIAJ CP-1201)	IN	Cannon XLB-3-31 x 1		
		RCA/phono jack x 1		
	OUT	Cannon XLB-3-32 x 1		
		RCA/phono jack x 1		
SYNC Input	BNC connector (Video sync digital wordclock), Video input: 1 V pp (75 Ω)			
SCSI–A Connector	1 x 50 pin Amphenol			
PHONES	1 x 6.3 Ømm stereo phone jack (Maximum output 60 mW, Load impedance 32 Ω)			
FOOT SW	1 x 6.3 Ømm phone footswitch jack			

Specifications (Continued)

REMOTE/THRU	8-pin DIN connector (Front panel x 1, Rear panel x 2)	
Extension Slots x5	SCSI-B, SMPTE, MIDI, RS422, Bi-phase, ADAT optional boards	
Mixer Parameters	LEVEL	Channel level (0 ~ 127)
	PAN	Stereo pan position (L63 ~ MID ~ R63)
	SEND1, SEND2	Mono send level (0 ~ 127)
	SENDS	Stereo send level (0 ~ 127)
	SDPAN	Stereo send pan (L63 ~ MID ~ R63)
	BUS	Bus mode (ON, OFF)
	METER	Channel level (PRE, POST)
	MASTER	Master output (0 ~ 127)
	SENDS	Send mode (MONO, STEREO)
	SEND1, SEND2	Mono send (PRE, POST)
	SENDS	Stereo send (PRE, POST)
	METER	Meter mode (NORMAL, HOLD)
	FADE	Fade time (OFF, 001~126, ALL)
Supplied Accessories	Power cable	
	Owner's Manual	
Power Requirements	U.S.A. & Canada	120 V AC, 60 Hz
	Europe	220 - 230/240 V AC, 50 Hz
	Australia	240 V AC, 50 Hz
Power Consumption	120 W (U.S.A. & Canadian model)	
Operating Temperature	5°C ~ 40°C (40°F ~ 105°F)	
Operating Humidity	30% ~ 80% (no condensation)	
Dimensions	483 (W) x 179 (H) x 410 (D) mm (443.5 overall, EIA 4U)	
Weight	15 kg (model DR16HD 15.7 kg)	

Specifications subject to change without prior notice.

MIDI Implementation Chart

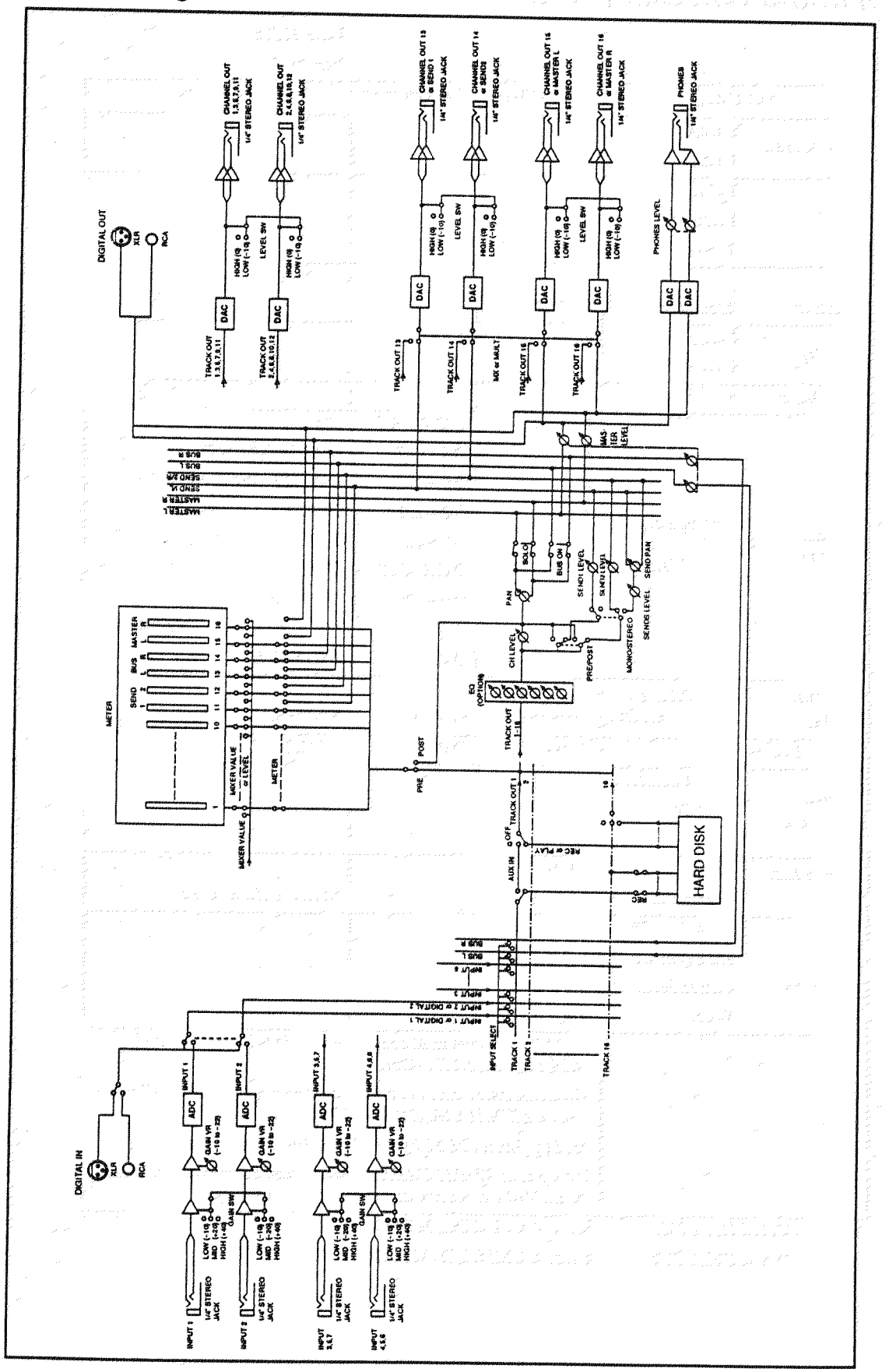
Date: 11/95
Version: 1.0

Function		Transmitted	Recognized	Remarks
Basic channel	Default	X	X	
	Changed	X	X	
Mode	Default	X	X	
	Messages	X	X	
	Altered	**********		
Note Number:	True Voice	X **********	X	
Velocity	Note On	X	X	
	Note Off	X	X	
Pitch Bend		X	X	
Control Change	Setting Range OFF 0 ~ 127 (Any)	X	O ON/OFF	CH ON
		X	O 0 ~ 127	LEVEL (Default 7)
		X	O 0 ~ 127	PAN L63 - R63 (Default 10)
		X	O 0 ~ 127	SEND1
		X	O 0 ~ 127	SEND2
		X	O ON/OFF	BUS
		X	O 0 ~ 127	MASTER
				MIDI CH 1-16=TRACK MIX 1-16
		X	O 0 ~ 127	FADE TIME
Program Change	Setting Range OFF, 1 ~ 16, OM	**********	O 0~ 99	PC-SNAP
System Exclusive		O (*1)	O (*3)	MTC, MMC
System Common	Song Position	O		
	Song Select	O	O	
	Tune	X		
System Real Time	Clock	O (*2)		
	Command	O		Continue, Stop, Start
Aux Messages	Local On/Off			
	All Notes Off			
	Active Sense			
	Reset			
Notes		(*1) MTC is transmitted only when the SYNC mode is set to MIDI-MTC MASTER - ON. (*2) Clock commands are only transmitted when the SYNC mode is set to MIDI-SPP MASTER - ON. (*3) Support for MMC System Exclusive. The optional IB-803M MIDI interface must be installed in order for the DR16 to receive or transmit MIDI messages.		

Mode 1: OMNI ON, POLY Mode 2: OMNI ON, MONO O: Yes

Mode 3: OMNI OFF, POLY Mode 4: OMNI OFF, MONO X: No

Block Diagram



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